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U. S. Department of Agriculture

VOLUME NO. 2

Includes

CHEMISTRY AND SOILS
BUREAU OF ENTOMOLOGY
BIOLOGICAL SURVEY
BUREAU OF PUBLIC ROADS
AGRICULTURAL ECONOMICS
BUREAU OF HOME ECONOMICS
PLANT QUAR. & CONTROL ADMN.
GRAIN FUTURES ADMINISTRATION
FOOD AND DRUG ADMINISTRATION
INTERCHANGE OF APPROPRIATIONS
MISCELLANEOUS (INCLUDING ROAD ITEMS)
LAWS

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EXPLANATORY NOTES

OF

INCREASES, DECREASES, AND CHANGES IN LANGUAGE

IN THE BUDGET FOR THE

DEPARTMENT OF AGRICULTURE

FOR THE

FISCAL YEAR ENDING JUNE 30, 1931

AND OF

WORK DONE UNDER EACH OF THE APPROPRIATION ITEMS.

VOLUME NO. 2

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BUREAU OF CHEMISTRY AND SOILS

(a) GENERAL ADMINISTRATIVE EXPENSES

APPROPRIATION, 1930 . . . . . $58,540

Budget, 1931 58,540

Project Statement

Project	Expended 1929	Estimated 1930	Estimated 1931	Increase
General Administration.	$ 58,111	$ 58,540	$ 58,540	

Activities under this Appropriation

General

This appropriation provides for salaries and expenses of the Office of Chief of Bureau and general organization units, such as accounting, personnel, supplies, etc.

BUREAU OF CHEMISTRY AND SOILS (Continued)

(b) AGRICULTURAL INVESTIGATIONS

Appropriation, 1930	$ 286,570
Budget, 1931	340,000
Increase	53,430

The increase of $53,430 is submitted for the following purposes:

(1) $12,000 for investigations of toxicity of foods contaminated by metals and poisonous spray residues. The study of the toxicity of foods contaminated by various metals and the toxicity of spray residues and the residues from fumigating chemicals on foods is essential at this time in order to safeguard the consuming public in the use of foods containing these various chemicals. The use of such materials in the combatting of insect pests and diseases of fruits and vegetables and manufactured food products is the most effective known method of reducing the enormous losses caused by such factors. The health hazard, however, is not known, and it is necessary that consideration be given to the matter. There were no funds available during the fiscal year 1930 for this work, and it is urgently recommended that funds be provided in 1931 to study the toxicity of chromium alloys now being developed for food utensils and machinery, the further study of arsenic, the study of the toxicity of hydrocyanic acid, ethyl formate, ethylene oxide, and ethylene dichloride, and such new insecticides and fumigants as are promising.

(2) $10,000 for studies of spoilage of raw and manufactured foods. Losses due to spoilage and deterioration of foods are enormous. Such problems as the bacterial and mold infection of raw and refined sugar and other products, slow changes which take place in flour, dried milk, the changes taking place in canned goods, the deterioration of materials containing cereal germs, are examples. Some progress has been made which includes not only a knowledge of the actual changes brought about in certain food materials, which has also resulted in the development of new and improved methods for the prevention or retardation of both spoilage and deterioration. The problems are of such magnitude and the values represented are so great that it is important that they be investigated as rapidly as possible in order that these losses may be decreased.

(3) $5,000 for studies of composition, utilization and spoilage of eggs. The increased use of eggs in various manufactured food products has developed a series of problems the solutions of which are of the

greatest importance to egg producers, egg handlers, distributors, manufacturers, and the ultimate consumers. Such problems as the mold spoilage of the shell eggs, the influence of moisture on the storage and keeping quality of eggs, the chemical composition of yolks and whites, changes taking place in storage of shell and frozen eggs, and the development of new methods for the utilization of egg whites, are urgently in need of study. No scientific work of the character indicated is now being done in either this or any other Federal Department.

(4) $5,000 for fruit and vegetable utilization. The utilization of cull and surplus fruit and vegetables, as well as the waste materials obtained in the manufacture of fruits and vegetables into various preserved food products, constitutes a very important economic problem in American agriculture. It is proposed to investigate the possibility of the manufacture of fruit juices, especially the preparation of new blends of carbonated and sugar juices with a view to assisting the fruit growing industry, as well as the fruit consumer. As this is directed at the utilization of agricultural surpluses and wastes, it is a project of great interest and vital importance. The work contemplated would be coordinated with work on the same subject by the Bureau of Home Economics.

(5) $2,430 for investigation of ethylene gas in treatment of fruits and vegetables. The increased attention which is now being paid to the production and distribution of fruits of a high quality, has placed an added importance on the extension of the studies of the possibility of using ethylene in the treatment of such fruits as dates, figs, melons, pears, strawberries, grapes, etc. These crops are of a very great commercial importance, and it is important that the critical studies necessary to establish the suitability of this gas treatment for these fruits should be done by this Department, which discovered the method and developed its initial commercial application. It is further believed that this ethylene work should be intensively followed for a sufficient length of time to clearly establish the suitability or unsuitability of this method for all of the more important commercial fruit crops. The question of availability of ethylene for the various fruits mentioned should be determined at the earliest possible date. Study should be made on a commercial scale of the value of ethylene gas pretreatment of other fruits, etc. If this method proves to be as satisfactory for those fruits indicated above as for citrus fruits, it will add materially to the commercial value of these crops.

(6) $7,000 for studies of methods of fireproofing and preservative treatment of fabrics. The development of a satisfactory fireproofing treatment will materially increase the use of cotton goods in making awnings. It is estimated that between 25 and 30 million yards of cotton duck are used annually in making awnings and that, with a satisfactory fireproofing treatment, this quantity can very largely be increased to the benefit of the cotton producer, cotton manufacturer, and the users of awnings. It is proposed to make a thorough study of the subject of

developing a weatherproof, fireproof treatment for cotton duck. The Cotton Textile Institute is cooperating with the Department in expanding the uses of cotton and cotton goods, and the Department has been repeatedly urged to make studies of this problem.

(7) $8,000 for studies on the utilization of farm wastes for paper board, and studies on the durability of paper. This amount is requested to enable the Bureau to make studies with a view to the utilization of farm products and wastes in the making of paper and paper board of all kinds, which is urgently needed considering the intense interest in the utilization of such materials. The durability of paper for various purposes and from different materials should be carried on at the same time, and is very urgent considering the fact that much of our paper used for record purposes deteriorates very rapidly. The durability of paper prepared from annual crops is not known.

(8) $4,000 for studies of chemical properties and economic utilization of lignin. Lignin is present in all agricultural wastes, from 20 to 30 per cent. With the funds now available, progress is being made upon the study of the constitution and properties of the lignin molecule. The increase requested is necessary to determine the rate of formation of lignin in growing plants, and investigations to determine the amount and properties appearing at various stages of growth, all of which has a bearing upon the utilization of lignin in agricultural wastes.

Project Statement

Project	Expended, 1929	Estimated, 1930	Estimated, 1931	Increase
Carbohydrates	$41,446	$ 44,250	$ 44,250	$
Crop Chemistry	15,844	17,318	17,318	
Food research	71,450	74,253	101,253	27,000 (1-2-3)
Fruit and vegetables	39,897	42,701	50,131	7,430 (4 & 5)
Industrial farm products	40,703	43,507	58,507	15,000 (6 & 7)
Lignin research	9,051	10,855	14,855	4,000 (8)
Oil, fat and wax	16,711	18,515	18,515	---
Protein and nutrition	33,367	35,171	35,171	---
Total	$268,469	$286,570	$340,000	$53,430

Activities under this Appropriation

General

The activities under this appropriation are confined to the chemical and biological investigation of foods and substances used in the manufacture

thereof, and of agricultural products used for other purposes. They include fundamental investigations aimed at better preparation and utilization of known commercial products and of developing new products having commercial value. These investigations also include physiological effects of those products used for foods on the human organism. Active cooperation with associations and scientific societies is maintained in developing methods of analysis which will be more accurate and more uniform.

Carbohydrates: The production of cane and beet sugars, and honey and honey products, and the production of starch and starch products from sweet and white potatoes and rice, and the characteristic carbohydrates of various native plants not at present commercially utilized to determine their industrial and food value, are being actively investigated. A new product, "cane cream", has been developed from the cane juice without striking off sugar; also a blending sirup of excellent grade made from that portion of the cane juice which is of the lowest purity has been produced. An automatic electrometric method of control of cane juice clarification in the manufacture of raw sugar and of one stage of beet juice clarification has been devised. The juice of cane grown in continental United States is usually of lower purity than the juice from cane grown in the tropics, which is an obstacle to the highest efficiency in the recovery of sugar. Thus, at the Field Station, established at Houma, Louisiana, in cooperation with the American Sugar Cane League, investigations are being conducted for the purpose of improving methods of clarification of cane juice, and to improve the quality and uniformity of direct-consumption sugar produced on the plantation.

Crop Chemistry: Improvement in the utilization of our crops depends to a great degree on a knowledge of the factors, both natural and artificial, which affect the quality of the crops. Wheat, one of our most important foodstuffs, is utilized chiefly as a source of two essential food materials, carbohydrates and proteins. Much of the wheat on the American market is sold on the basis of its protein content, since it is recognized that wheat high in protein has greater nutritive value and the flour made from it better baking quality. Any increase, therefore, in the protein content of wheat will not only stimulate both domestic and foreign demand but furnish consumers with a product of superior nutritive value. In field experimental plots the Bureau has demonstrated that wheat high in protein content is obtained when sodium nitrate is applied to the soil at time of heading. These experiments are being repeated during successive years to obtain data on the effect of variable climatic conditions and to adapt the method to large scale work. Studies are also being carried on to determine the effect of applying various fertilizers to wheat at different stages of growth;

to increase the phosphorus content of wheat, to obtain data as to the relation of manganese to the quality of crops and to secure data as to the distribution in crops of iodine and fluorine which are believed to be of considerable significance in nutrition.

Food research: Food research problems include fundamental studies of foodstuffs in all phases of their development from raw materials to the finished products. These studies are made both in the laboratory and in the field in collaboration with large scale producers. The problems under study are considered from the viewpoints of the chemist, the mycologist, the bacteriologist and the microscopist in the fields of phytochemistry, toxicology, cereal chemistry, chemistry of plant products, food micro-biology and metals in foods.

Recent work has resulted in the development of information along special lines of spoilage and deterioration. It included a study of the bacterial flora of raw and commercial sugars, a confirmation of the relation of certain organisms to peculiar types of spoilage in canned foods, a study of the biological and chemical factors concerned in the production of gas in canned sirups and a deterioration of some of the causes underlying the spontaneous decomposition of sugar cane molasses.

Work on the slow changes taking place in flours, dried milk, dried fruits, the changes taking place on long storage of canned goods, the utilization of such nutritious food materials as the various cereal germs, involving methods of treatment which will retard or prevent rancidity, the fermentation of sirups and molasses and the bacterial and mold infections of raw and refined sugars are illustrations of a number of problems, the solutions of which will result in enormous savings.

Fruits and vegetables: These investigations are concerned with the economical utilization of fruit and vegetable culls; various methods of preserving fruits and vegetables by drying, by chemical treatments, and by other recognized processes; utilization of cannery wastes and means for improving the natural color of fruits and vegetables.

The work that has been done on the utilization of citrus culls and wastes has resulted in the establishment of by-product factories turning out products valued at more than a million dollars a year. The citrus culls and wastes which formerly cost a dollar a ton to be disposed of are now returning from $12 to $14 a ton to the growers. During 1929 studies were begun on the composition and utilization of grapefruit oil and of the manufacture of pectin from grapefruit waste.

The production of pectin from grapefruit waste and the utilization of the residue in the preparation of cattle and chicken feed has been undertaken on a semi-commercial scale.

Industrial Farm Products: This work includes scientific, technical and economic studies on tanning materials, hides and skins, tanning processes, leather and leather substitutes, paper, farm fabrics and wool scouring wastes.

The conditions, influences and factors involved in the ante-mortem and post-mortem production of hides and skins were studied and scientific and technical knowledge applied for their improvement. Laboratory researches have been made of the causes of specific defects to determine their origin and to discover means for their elimination. Investigation of the damage caused to hides by salt stains, defective methods of curing, improper handling, faulty storage conditions are some of the more important phases of the problem that are under consideration. Field work was carried on with butchers, packers, hide dealers and tanners.

Canaigre, foreign chestnut trees, waste hemlock bark, and barks from Honduras were investigated for tannin content. This work is done in cooperation with the Bureau of Plant Industry. The tannin content of woods and barks collected by the Bureau of Plant Industry in China, Japan and Formosa, is being determined by analysis and studies of tanning and color effects. The distribution of tannin in domestic grown Chinese chestnut trees is also under investigation.

Activities under this allotment include investigations on more effective methods of waterproofing canvas and other cotton fabrics for protecting hay and grain in the shock and stack, supplies and produce that may be damaged by rain, farm implements and machinery, and for other outdoor uses; aslo investigations on fireproofing treatments that will stand exposure to weather without losing effectiveness, treatments to prevent deterioration of canvas and other fabrics by mildew, bacteria, and sunlight, and treatments to protect fertilizer bags from rapid deterioration by contents.

Experiments on the effects of phosphate fertilizer on cotton and jute bagging, preliminary to work on preservative treatments for fertilizer bags, showed that deterioration is extremely rapid and that there is no noticeable difference between untreated jute and untreated cotton as regards resistance to such deterioration.

An extensive investigation of the causes of deterioration of printed and written records has been started and while sufficient work has not been done to justify definite conclusions, it is almost certain that the presence of sulphuric acid from sizing materials and the

absorption of sulphur acids from the atmosphere are largely responsible for the lack of durability of the paper.

Work on the utilization of farm products and wastes in the making of paper and paper board was continued and an economic survey of the status of cornstalks utilization was made.

Lignin research: Lignin, one of the three important components of agricultural waste, constitutes from 20 to 30 per cent of the dry material of straw, cornstalks, corncobs, oat hulls and many other forms of farm waste. It has been estimated that the annual production of lignin in the United States is approximately 40,000,000 tons and most of this is wasted. Its utilization is one of the most important problems confronting the agricultural industries at the present time but little is known, however, of its chemical nature or potential value.

A chemical study of lignin from corncobs, oat hulls, and wheat straw in order to obtain data on its chemical nature, and to determine the essential difference in lignin obtained from different agricultural waste materials, was undertaken.

Acetone, acetic acid, wood alcohol, guaiacol and eugenol resulted from studies of the various destructive distillation products obtained from lignin. The two last mentioned substances are used to considerable extent in the pharmaceutical industry. An investigation was also started to determine the role of lignin in causing "lodging" in various farm crops. In our work on the commercial utilization of lignin a whole series of new resins have been developed which may be utilized in the plastic and varnish industries.

The various food materials fed to farm animals contain considerable amounts of lignin (in some cases such as hay, it may amount to as much as 20 to 25 per cent of the dry weight of the material), but nothing definite was known of the digestibility of lignin. A study was, therefore, made and it was found that lignin in passing through the animal body suffers a change in its composition, thus indicating that the animal body is capable of breaking down lignin and possibly digesting it.

Oil, Fat and Wax: Researches are being conducted with a view to improving the technological processes of oil refining, and a more complete utilization of a product that represents so much of the farmer's labor and the resources of his land. Estimation of the neutral blycerides in crude cottonseed oil has placed the purchase of oil on a scientific basis. Studies in deterioration of cottonseed oil has furnished an important knowledge to crude oil millers. Fundamental studies upon the composition of a number of oils, fats and waxes, such as reindeer fat, walnut oil, safflower seed oil, Chia seed oil, palm oil, avocado oil and grapefruit seed oil are being made.

Protein and Nutrition: To the producer of farm products the value of the essential elements is of primary importance. Protein is not only one of these primary constituents but, as compared with fats and carbohydrates, protein is the most valuable and the most costly. Hence, to the agriculturist a fundamental knowledge of the constitution of protein is of no less importance than are ways and means to its cheap and abundant production.

The proteins of different feedingstuffs show striking differences in food value and a knowledge of the chemical properties and nutritive value of these proteins is necessary to produce maximum animal growth with minimum expenditure. Until recently a diet was considered complete if it contained the four basal dietary factors, proteins, fats, carbohydrates and mineral matter. It has now been established through the work of the Protein and Nutrition Division of the Bureau that if the protein is not of the right quality, animal growth and development will be retarded. An exact knowledge of the chemical composition of the different proteins in foods and feeds is essential not only to know whether they are adequate in themselves but also to know, when they are deficient, what proteins should be added to supply the deficiency. It is believed that work of this character will lead to the sale of feeds on the basis of their qualitative and quantitative composition instead of, as at present, on their high or low protein content.

(c) COLOR INVESTIGATIONS

Appropriation, 1930	$ 78,000
Budget, 1931	88,000
Increase	10,000

Increase of $10,000 is recommended for the study of the action of micro-organisms as they relate to the production of chemicals from various agricultural products and waste materials, as a means of utilizing industrially agricultural wastes and culls. Citric acid is now being produced by this method, and the Bureau has just developed a means of producing gluconic acid, the calcium salt of which shows great promise for use as a medicine and as an ingredient of live stock and poultry feed to increase easily-assimilated calcium content, of importance in maintaining the health and vitality of impregnated females and increasing thickness of shells of eggs from high-producing hens. Fermentation methods for the production of valuable chemicals are comparatively new, but hold out great promise as a means of converting wastes into valuable materials.

Project Statement

Project	Expended 1929	Estimated 1930	Estimated 1931	Increase
Color and farm waste . .	$ 76,172	$ 78,000	$ 88,000	$ 10,000

Activities under this Appropriation

General

Activities under this appropration are confined to investigations and experiments in the utilization of materials produced in the United States in the manufacture of dyes and medicines, and for industrial purposes, and when found advisable, in cooperation with individuals, associations and corporations.

The Bureau has undertaken a detailed study of the Friedel Craft reaction for the preparation of vat dye intermediates, which has already resulted in a saving of 30 per cent of the cost production of this important class of dyes. Vat dyes are the most important single class of colors and are superior to all others, both in brilliancy of color and permanency of shade, for the dyeing of cotton. The output of vat dyes in the United States is more than 6,500,000 pounds per annum, valued at about $6,000,000. In variety, however, the domestic supply is not yet equal to the demand and a considerable quantity of these dyes are imported. The recent work which has been carried on in the laboratory with diphenyl in forming dye intermediates has been exceedingly successful and will lead to the development of a new line of dyes which have never before been produced.

A marked feature in the progress of chemical industry in this country and elsewhere during the past ten years has been the employment of micro-organisms to perform large scale chemical transformations. This development is of special interest to agriculture evidenced by the fact that more than ten million bushels of corn yearly are employed in one of these processes for the production of lacquer solvents and five million pounds of sugar yearly are utilized in the production of citric acid. This latter process was initiated in the Department about ten years ago. It is hoped that our investigations may lead to the utilization of other agricultural products and wastes.

The formation of gluconic acid from corn sugar by the action of fungi has been developed on a semi-plant scale. With the development of a process which makes commercial production possible, research into some of the salts of gluconic acid is actively being carried on in many commercial laboratories. Its properties indicate that it will find use in the soft drink, textile, tanning and pharmaceutical industries.

(d) SIRUP AND SUGAR INVESTIGATIONS

Appropriation, 1930 . . . . . $ 37,600
Budget, 1931 37,600

Project Statement

Project	Expended 1929	Estimated 1930	Estimated 1931
Sirup & sugar investigations	$ 34,923	$ 37,600	$ 37,600

Activities under this Appropriation

General

The work includes the investigation and development of methods for the manufacture of table sirups and sugar, and of methods for the manufacture of sweet sirups by the utilization of new agricultural sources.

Cane and sorghum sirups are produced on thousands of farms in the United States. The annual normal production is thirty to forty million gallons of each.. These are cash crops and because of this fact are more important in the scheme of farming of thousands of small farms than is indicated by their value in comparison to other crops. These sirups vary greatly in quality and this reacts considerably to the disadvantage of the producer in this day of standardized quality of food products. The new information developed by the Bureau regarding the various constituents of cane and sorghum juices is of such a broad character that it can be applied with considerable benefit to the problems of producers of raw cane sugar. The results can also be applied in a constructive way to beet sugar production.

The general purpose of the work on maple sirup and sugar is to promote the production of puremaple products of high quality which will net a more adequate return to the producer than the sale of maple sirup and sugar to be used as a raw material by middlemen. Profits to maple sirup and sugar producers have been adversely affected due to the use of considerable quantities of these products as raw material for

mixing with cane sugar sirups by middlemen. Producers have attempted to protect themselves by developing other outlets for pure maple products, hoping thus to obtain a greater proportion of the consumer's dollar. This has taken the form of development of "quality products" such as maple cream and pure maple candies. Efforts along this line have given promise of considerable success.

(e) INSECTICIDES AND FUNGICIDES INVESTIGATIONS

Appropriation, 1930	$ 83,765
Budget, 1931	100,000
Increase	16,235

The increase of $16,235 is submitted for the following purposes:

(1) $5,235 for Synthetic Organic Insecticides and Fungicides Investigations. This increase is necessary with special reference to the control of the perennial canker which threatens the destruction of certain orchards in the great apple-growing sections of Hood River, Oregon, and Wenatchee, Washington.

(2) $7,000 - Investigations of Fumigants. We have been urgently requested by the Division of Tropical and Subtropical Plant Insects of the Bureau of Entomology, to send a chemist to Whittier, California, to work there with the entomologists on the fumigation problems of the citrus fruit industry. Most of the California citrus fruit is fumigated with hydrocyanic gas, which is not proving effective for the control of certain insects. The investigations contemplated are to seek a substisute for this gas for use in fumigation.

(3) $4,000 for Investigations of Colloidal Insecticides and Fungicides. Recently mineral oil emulsions have been used against both scale insects and the white fly. Certain of the oils cause injury to the foliage and to the fruit. With other oils, there is practically no injury. The determination of the properties of the oils in use should be

made to discover the factors causing injury. This covers investigations not only of the oils themselves, but also emulsifiers which are used in producing the emulsions, as well as other added insecticidal constituents. This is a very important line of work and is urgent. We have been requested by the Bureau of Entomology to send a physical-chemist to New Orleans, Louisiana, to work in cooperation with the entomologists there in the study of oil emulsions.

Project Statement

Project	Expended 1929	Estimated 1930	Estimated 1931	Increase
Insecticide & fungicide investigations	$ 47,388	$ 83,765	$ 100,000	$ 16,235

Activities under this Appropriation

General

The object of these investigations is to develop better methods for the manufacture of known insecticides, fungicides, and fumigants, and for the preparation of new compounds and materials having insecticidal and fungicidal properties, and a study of the chemical problems relating to the application of these materials.

Study is being made of pyridine derivatives, and such compounds as nicotine and neonicotine have been synthesized, and the latter is being prepared commercially as a substitute for nicotine. Studies are being made of aliphatic derivatives such as derivatives of formic and chloroacetic acids, and also compounds containing the ethylene oxide linkage which appear to have insecticidal value.

Investigations are being carried on upon methods of removing lead arsenate spray residues from fruits. It has been found that the addition of sodium chloride and sodium sulphate to the usual hydrochloric acid used greatly enhances the solvent solution for lead arsenic.

Our investigation of flourine compounds for insecticidal purpose holds considerable promise. Certain of these compounds appear more effective than lead arsenic in controlling European Corn Borer.

It has been found that the addition of carbon dioxide gas in a fumigating chamber enhances the insecticidal efficacy of the fumigant, such as, for example, ethylene dichloride, and greatly shortens the

period of exposure. Recent work with ethylene oxide indicates that when used in vacuum fumigating apparatus, it is even more toxic than hydrocyanic acid against certain insects.

Collections of such materials as derris, cube, and other tropical fish-poisoning plants, have been made. These plants are known to have insecticidal properties. Their toxic principles are now being studies in the laboratory and later an attempt will be made to synthesize those that seem to show promise.

The Bureau of Chemistry and Soils is cooperating with the Bureau of Plant Industry and the Bureau of Entomology in their respective fields to develop new insecticides, new fungicides for the control of the perennial canker, grain smuts and other fungi, and for fumigants which are free from the fire hazard of carbon disulphide and the human hazard of hydrocyanic acid gas.

(f) DUST EXPLOSIONS AND FARM FIRES

Appropriation, 1930	$ 51,500
Budget, 1931	51,500

Project Statement

Project	Expended 1929	Estimated 1930	Estimated 1931
Dust explosions	$ 29,495	$ 36,400	$ 36,400
Farm fires	23,595	15,100	15,100
Total	$ 53,090	$ 51,500	$ 51,500

Activities under this Appropriation

General

The object of these investigations is to acquire fundamental knowledge pertaining to dust explosions and farm fires with a view to developing methods for their prevention.

Dust Explosions: Marked progress has been made in the development of inert gas systems for fire and explosion prevention. Special equipment for testing explosibility of dusts was designed and special type industrial plant dust explosions are being studied. Progress was made in developing belt dressings for the control of static electricity. Special attention is being given to the development of safety codes for dust explosion prevention in representative industries, and active cooperation was carried on with industrial companies, insurance organizations, State Commissions, safety organizations and other interested agencies.

Farm Fires: Special studies are being made of the spontaneous heating of hay and other agricultural products, involving both laboratory and large scale experimental work. In this experimental work, conditions believed to be ideal for the self-ignition of hay and resembling those ordinarily found inffield conditions is being produced. This work comprises fundamental research to determine the factors contributing to spontaneous heating and ignition of agricultural products and to develop practical methods of prevention.

(g) NAVAL STORES INVESTIGATIONS

Appropriation, 1930	$ 32,000
Budget, 1931	32,000

Project Statement

Project	Expended 1929	Estimated 1930	Estimated 1931
Naval stores research . .	$ 14,979	$ 32,000	$ 32,000

Activities under this Appropriation

General

The purpose of these investigations is to investigate and demonstrate improved methods or processes of preparing naval stores, and to make fundamental studies on the composition and properties of turpentine and resin.

Technological work at stills in which the equipment, methods of production and costs are studied, has resulted in a reduction in cost, a superior and increased quantity of turpentine and resin, and elimination of waste, resulting in increased net returns. A steam turpentine still has been devised which produces a higher grade of resin than has heretofore been produced. While only seven of these stills have been installed to date, it is anticipated they will be in general use within the next few years to the advantage of both the producers and users of resin. General technological field work will be continued and the chemical and physical properties of resin studied, and experiments conducted with a view to the prevention and deterioration of turpentine in storage.

Research on naval stores is under way in both the Bureau of Chemistry and Soils and the Forest Service. The bureau of Chemistry and Soils handles research on distillation, refinement, and uses of commercial products, that is, after the resin is taken from the tree. The Forest Service covers the forest or woods phase of naval stores work up to the time the resin is taken from the tree.

(h) SOIL CHEMICAL INVESTIGATIONS

Appropriation, 1930	$ 36,100
Budget, 1931	40,000
Increase	3,900

The increase of $3,900 is submitted for practical application of soil colloidal studies to fertilizer practices. The active component of the soil on which its utility depends is the colloid in it. This component is the very fine material which is the source and storage room of the plant food. The amount and quality of the colloid varies widely according to climatic and other regional factors. It is believed possible to establish on a firm scientific foundation, a method of diagnosing and prescribing for a soil type in such manner as to fit the various soil types and climatic conditions. This work is important to the application of fertilizer practice upon a sound and scientific basis.

Project Statement

Project	Expended 1929	Estimated 1930	Estimated 1931	Increase
Soil chemistry	$ 33,497	$ 36,100	$ 40,000	$ 3,900

Activities under this Appropriation

General

The work of this Division includes the analyses of soil samples, soil colloids and related material for the use of the Soil Survey and for many other divisions and bureaus of the government service, and for intelligent reply to queries from the public.

Soil colloid research is being carried on intensively to determine the application of colloid knowledge to soil management through a study of the availability of phosphoric acid in relation to the colloid present in different soil types. A study of the organic colloids and their function in soil behavior is also being made.

The causes of infertility of non-fertile soils are being studied through research upon soils known to be non-productive. Peat deposits in Maine, Washington, North Carolina, and Florida are being studied for the purpose of determining the best means for their utilization. The erosional characteristics and the percolation rates of soils are being investigated as a supplement to the broad program of erosion control. The optical identification of fertilizer compounds is being studied as an aid to the research of the fertilizer division.

(i) SOIL PHYSICAL INVESTIGATIONS

Appropriation, 1930	$ 18,100
Budget, 1931	18,100

Project Statement

Project	Expended 1929	Estimated 1930	Estimated 1931
Soil physics	$ 17,853	$ 18,100	$ 18,100

Activities under this Appropriation

General

This work includes the making of mechanical analyses of soils and soil materials and a number of other physical tests for the use of the Soil Survey and many other branches of the government service. Research upon the methods of analysis has resulted in the developments of new and much more rapid methods of analyses as applied to soils, ground rock phosphate and other mineral powders. Research is in progress on the effect of supersonic vibrations on the dispersion of soil material. An investigation of plasticity measurements is in progress in the expectation of developing an exact expression of differences in this important property of soils.

(j) FERTILIZER INVESTIGATIONS

Appropriation, 1930	
Facial	$ 311,500
Amount available, 1930, for Potash Investigations, provided by Second Deficiency Act, 1929	25,000
Total available, 1930	$ 336,500
Budget, 1931	345,000
Increase	8,500

Apparent increase of $8,500; Actual increase of 9,980, due to dropping $1,480 appropriation 1930, for x-ray equipment.

(1) $5,000 for high temperature vapor pressure and colloidal properties of phosphate rock investigations. Apparent increase $3,520, but taking into consideration a reduction of $1,480, provided in the 1930 appropriation bill for the purchase of special X-ray equipment, the net increase is $5,000. Essential basic work is planned to determine the reaction mechanism of the volatilization process for the manufacture of phosphoric acid. In particular there are needed the vapor pressures and specific heats of various phosphatic raw materials to aid in making the commercial processes most efficient, and to determine which materials are best suited to the process. The object is to so improve the process that the cost of pure phosphoric acid may be reduced so as to make it available for use in the manufacture of concentrated fertilizer. Millions of tons of finely divided phosphate are estimated to exist in abandoned waste-ponds in the Florida hard rock phosphate district, and this material, which carries much phosphate, is being continuously deposited during the process of preparing the hard rock phosphate for the market.

(2) $4,980 for concentrated fertilizer investigations. This increase is recommended to enlarge the work of the distribution and application of concentrated fertilizer. The production of fertilizers with increased plant food emphasizes the necessity of a larger research program. A conservative estimate of saving in methods now employed is two and one-half millions of dollars annually. It is more than probable that within a few years the plant food in fertilizers will be increased more than 50 per cent, resulting in a saving to the farmers of over $15,000,000 annually. A decrease of 5 per cent only, in the weight of fertilizers applied would mean a saving in the fertilizer bill of the country of over $12,000,000. This work will be carried on in cooperation with the Bureau of Public Roads.

Project Statement

Project	Expended 1929	Estimated 1930	Estimated 1931	Increase or Decrease
Mechanism of catalysis . .	$ 37,292	$ 35,471	$ 35,471	-
Transformation of nitrogen compounds	35,938	35,787	35,787	-
Mechanical engineering . .	46,330	47,394	47,394	-
Chemical engineering . . .	19,567	20,438	20,438	-
Biochemical and organic investigations	27,553	28,681	28,681	-
Physics investigations . .	32,306	34,748	33,268	$ -1,480
Gas constants and chemical analysis	24,802	25,709	25,709	-
Phosphate and potash investigations	41,718	50,703	55,703	+ 5,000 (1)
Concentrated fertilizers .	56,430	57,569	62,549	+4,980 (2)
Total	(a)$321,936	(b)$336,500	$345,000	$+8,500

(a) Includes $17,000 for Potash Investigations, Second Deficiency Act, Fiscal Year 1929.
(b) Includes $25,000 for Potash Investigations, Second Deficiency Act, Fiscal Year 1929.

Activities under this Appropriation

General

Activities under this appropriation are concentrated largely on the development of new processes for the production of nitrogen, phosphate, and potash fertilizers; the study of the practicability of using either new sources of raw products in their production, or of utilizing by-products from other industries; and the determination of the chemical and physical properties of the final products, particularly with regard to their suitability in various fertilizer mixtures. The research program is being developed with the idea that much of the information gained will be of a fundamental nature and have a far-reaching effect, rather than merely pertain to some process or problem of immediate interest only.

Mechanism of catalysis: In the commercial production of ammonia by the Haber process catalysts, which in this case consist of the oxides of certain metals, are necessary for the rapid chemical combination of nitrogen and hydrogen gases under high pressures. Catalysts are also commonly used in other chemical manufacturing processes. The work of this Laboratory during the past ten years has resulted in the finding of

suitable catalysts for nitrogen fixation, which are being used commercially at present. In order to obtain more information concerning the laws governing the activity of catalysts in general, and those connected with the synthetic ammonia industry in particular, a fundamental study of a number of catalysts and catalytic reactions is being made. Intensive investigations of the four or five catalytic materials that play important roles in the fixation of nitrogen, have resulted in a considerable number of publications of scientific and industrial importance. It is hoped that with the excellent cooperation of the X-ray, photochemical, and thermionic workers of the Laboratory great progress can be made in the next few years towards a better understanding of the factors responsible for the truly remarkable behavior of these very important catalytic materials.

Transformation of nitrogen compounds: In the synthetic ammonia process, ammonia is obtained as the principal product and carbon dioxide as a by-product. By introducing these two products, gases at ordinary temperature, into a closed vessel and heating to 150°C., they combine and form urea. This is a stable solid, easily soluble in water and of demonstrated value as a fertilizer material, with a high percentage of nitrogen.

A small semi-commercial plant was constructed and experiments made on this method of preparing urea. The results have indicated the commercial feasibility of the process and at the same time shown the necessity of a better understanding of the chemical reactions involved. A study is being made of the fundamental reactions to obtain data necessary for the proper design of commercial units. Since all of the ammonia and carbon dioxide is not converted to urea, a method of distilling off these gases and recovering them for return to the system has been devised. A study of the pressure exerted by these gases in the reaction chamber is being made to furnish information for use in the proper design of the still. The method of forming urea has been demonstrated and the conditions influencing the reaction and affecting the yield of urea are being determined.

Urea under humid conditions, takes up moisture from the air which may cause an undesirable physical condition for use as fertilizer. An effort has been made to reduce this moisture absorption without impairing the availability of the urea to the plant. Preliminary work has shown that urea when combined in some proportions with other substances, such as formaldehyde, gives a product with more desirable physical properties than urea alone, and still highly available as a fertilizer.

BUREAU OF CHEMISTRY AND SOILS (Continued)

Mechanical engineering: In the synthetic ammonia process for the fixation of atmospheric nitrogen the two gases, nitrogen and hydrogen, must be brought together at rather high pressures in the presence of a suitable catalyst. The duties of the Mechanical Engineering Section consist primarily in investigating, designing, testing, and developing such high pressure equipment. At present investigations are in progress on the design and operation of (1) a booster compressor to raise gas pressures from 3000 to 15,000 pounds per square inch, and (2) other vital equipment, such as relief valves, pressure gages, closures for cylinders, etc., necessary in high pressure gas systems. In addition, it is the duty of this Section to design miscellaneous special apparatus and equipment for use by those working in other projects.

Chemical engineering: The development of the nitrogen fixation industry, and the production of new fertilizers involved the use of corrosive substances in both the experimental and the manufacturing phases of the work. These corrosion phenomena are being studies for the purpose of finding or developing construction materials better suited to the industry. Familiar examples of such corrosive substances are hydrogen and ammonia at high temperatures and pressures, nitric acid in various concentrations and mixtures, and phosphoric acid, especially the crude material available for the production of high-grade fertilizers containing nitrogen and phosphorus.

Fertilizer economics, another phase of the work, deals with the economic situation which exists in the fertilizer industry. Information is constantly being gathered along this line in order that the pertinent facts may always be at hand and correct information available to those who wish it. Data on nitrogen production and use, imports and exports, prices, status of various manufacturing facilities, etc., are collected in this work.

Biochemical and organic investigations: The research work of this project is largely concentrated on the study of the mechanism of nitrogen fixation by living organisms, which in Nature are responsible for the fixation of about 90% of the nitrogen used by cultivated crops. One phase of the work deals with a study of the chemical and biological relationships which exist between legume nodule bacteria and their hosts. Another project is concerned primarily with the study of the free-living nitrogen-fixing soil microorganisms, particularly Azotobacter. These studies deal with such problems as the determination of the chemical steps in the fixation process, energy requirements for fixation in contrast to requirements for growth, behavior of the organisms in varying concentrations of nitrogen and other gases, and response to the various environmental factors which influence fixation.

The problem is also being attacked from the organic chemical standpoint, very reactive organic compounds, such as the free radicals, being studies in connection with nitrogen fixation. This work is now being extended to include a thermodynamic study of other types of organic compounds to determine which may have possibilities for use in nitrogen fixation. Especial attention is being given at present to the chemistry of chlorophyll and haemoglobin.

As a result of the work of the past year, the following important findings have been made: (1) It has been determined that legume nodule bacteria cannot fix nitrogen when growing apart from the host plant. This fundamental fact throws doubt upon the present generally accepted theory of legume symbiosis and paves the way for an entirely new angle of attack. (2) The studies of the chemical mechanism of nitrogen fixation is directly proportional to the pressure of nitrogen gas, between the limits of 1/25 and 2/3 (.05 to 0.5 atmospheres) of the nitrogen content of normal air. Practically no nitrogen fixation occurs at lower percentages of nitrogen gas. Above the 2/3 rate fixation remains constant. It has also been proven that these bacteria do not require an appreciable quantity of energy for fixation, the energy consumed being used almost exclusively for growth. These newly discovered facts are about the only ones known concerning the chemical mechanism of the fixation process. (3) Other experiments have shown for the first time that certain green plants (blue-green algae) can fix free nitrogen. This finding partially accounts for the large quantities of nitrogen occasionally fixed in certain soils where conditions are particularly favorable. Perhaps higher green plants may also fix nitrogen.

The entire program is being carried out with the expectation that any information gained may suggest marked improvements in commercial methods of nitrogen fixation; furthermore, practical results directly applicable on the farm may very likely follow. The work being done under this project represents a comparatively new line of research that has been developed slowly as new lines of attack were suggested by work already in progress.

Physics investigations: These investigations are concerned in general with securing fundamental data which may throw light on the reactions occurring in nitrogen fixation and other chemical processes. The physical methods and apparatus now commonly used in radio, X-ray, and radiation therapy are being adapted with excellent results to problems having a bearing on fertilizer production. Free nitrogen gas, for instance, is very inert as it exists in the air but may readily be made chemically active by physical methods; certain combinations of metallic oxides, called catalysts, may likewise accomplish the same. Studies on the underlying or fundamental principles of activation, catalysis, and radiation have already resulted in contributions that are known and applied both in this country and in Europe. Information regarding the nature of a catalyst surface, behavior of molecules, chemical reactions into which they enter, and strength with which the component atoms are bound together, has been obtained.

Aside from the main physics program, X-ray studies are being conducted with the idea not only of adapting such technique to investigations pertaining to fertilizers and fertilizer production, but also to general agricultural problems. Crystalline materials can be identified readily by means of their X-ray diffraction patterns, and even materials too finely divided to allow examination by other methods can be identified by means of their X-ray powder photographs. An investigation of the soil fraction, composed of sub-microscopic particles, led to the identification of the constituent minerals. It is the properties of these minerals that determine the quality of the soil. Examination of compounds formed between iron and nitrogen has resulted in information of great value in the industrial fixation of nitrogen, where iron catalysts are commonly employed. In certain other industrial processes, such as the case hardening of steel, the information will be of value. X-ray methods may also be applied to the study of fibers and a miscellaneous number of agricultural and industrial products.

Gas constants and chemical analysis: In the commercial production of ammonia, methanol, and certain other compounds the synthesis is made from gases at high pressures. At these pressures the physical properties of the gases cannot be even approximately estimated by the laws governing the behavior of gasses at moderate or low pressures. Accordingly, for the design of high pressure apparatus and for a complete understanding of the chemical equilibria involved in these syntheses, accurate compressibility data for the various gaseous constituents and mixtures are essential. At this Laboratory the compressibility of hydrogen, nitrogen and mixtures of these gases has been studied at temperatures extending from -70 to 400°C., and at pressures between 100 and 1000 atmospheres. Similar data have been obtained for carbon monoxide at nine temperatures from -70 to 200° and at 13 pressures between 25 and 1000 atmospheres. Work is now in progress upon the compressibility of several mixtures of carbon monoxide, hydrogen, and nitrogen; also of pure methane. The solubility of hydrogen, nitrogen, and hydro-nitrogen mixtures in water at high pressures is also being determined. A great deal of data has already been published.

An important service work is also being rendered by this division, namely, the carrying out of any necessary chemical analyses for the various members of the scientific staff. A total of between 2000 and 3000 determinations are being made yearly. These include samples of iron, steel, fertilizer, phosphate rock, potash-containing minerals, catalytic materials of various kinds, and many other miscellaneous materials.

Phosphate and potash investigations: America possesses vast potash resources in the form of potash minerals in which, however, the potash is so combined that it required chemical treatment for its liberation and full by-product utilization for its profitable production. American production is increasing and now exceeds 100,000 tons of potash salts per annum, while importations from Europe are 975,000 tons. The aim is to develop new methods and improve or cheapen the old.

Research projects on acid extraction methods are designed to establish fundamental chemical data on which to base economic analyses and industrial processes and therefore embrace the use of cheaper commerical acids, such as sulfuric, hydrochloric, nitric, and hydrofluoric in the decomposition of potash minerals for the recovery of as many merchantable products as possible and the elimination of impurities. Results to date indicate the feasibility of this line of attack as applied to the greensands of New Jersey and the alunites of Utah, and are being extended to embrace all the prominent potash minerals.

The utilization of the oxides of nitrogen as a chemical reagent for decomposing potash and other fertilizer minerals is a new development of these laboratories showing much promise as cheapening the production of both nitrates and potash. While effective as a solvent it contributes nitrogen in its most valuable form and obviates the use of other reagents which contribute no fertilizer value and therefore function only as expensive diluents. When applied to Georgia potash shale it liberates the potash as potassium nitrate, a highly concentrated and most valuable form of potash. The concurrent recovery of by-products from this and other potash minerals, such as the leucites of Wyoming, is the objective of present experimentation.

At high temperatures potash may be volatilized from its orea and recondensed as a concentrated product. As a means of conducting such procedures the adaptation of the iron blast-furnace technique appears the most promising of untried methods. Accordingly potash ores are being smelted for potash volatilization and the by-products, gas and slags, are being studied respectively for the production of hydrogen for ammonia synthesis and for the manufacture of cements. Local fuels occurring accessibly to the respective potash deposits are being studied to determine their suitability for use in the blast furnace. This proposal for potash manufacture gains in economic importance when linked with phosphate smelting, as referred to in a later paragraph.

A study of the production of phosphoric acid by furnace methods; by the use of nitrogen oxides; and by the sulfuric acid process is being made. With the development in these laboratories of operable electric furnace methods of volatilizing phosphorus from phosphate rock for the direct production of phosphoric acid, it became apparent that the prevailing costs of electric power were too high to admit of the use of this product in fertilizer manufacture. The blast furnace was adopted as a substitute for the electric furnace. Its adaptation has now been carried to the point where current results would seem to indicate very successful results for the future. The advantages to be anticipated are two-fold, namely, cheaper phosphate for the farmer, and more complete utilization of phosphate deposits. When combined with potash ores it appears that it may be possible to utilize the excess heat of the phosphate smelting for the volatilization of the potash.

To render phosphates agriculturally available by present methods phosphate rock is mined, washed, approximately one-half being discarded, the purified product then being dried, ground and treated with an equal weight of sulfuric acid to prodcue the superphosphate of commerce. The sulfuric acid serves as a reagent but remains as a worthless diluent to double transportation, sacking and handling costs. It has been found in these laboratories that when ammonia is burned in air and the combustion products are allowed to react on phosphate rock, the oxides are absorbed to form nitrates and the phosphate is rendered agriculturally available. In other words, the nitric oxide gases accomplish the same end as does the sulfuric acid but, instead of adding a diluent, contributes increased value and yields a product much more concentrated.

The production of phosphate by the sulfuric acid process is used almost exclusively today in the production of superphosphates. Work on the improvement and cheapening of the acid process is being carried on, particularly on the utilization of the by-products. For instance, investigations have recently shown that phosphate rock contains much higher percentages of fluorine than had previously been supposed, and methods of recovery of this material are being worked out. Fluorine compounds possess valuable properties as insecticides and agricultural poisons. Another opportunity for saving also exists in the working out of methods for utilizing the severl million tons of "waste" phosphate in Florida which is not suitable for use in the acid methods because it contains a high content of alumina and is low in phosphate content. It has been known for a long time that ammonia will react with water-soluble superphosphates to a limited extent. Conditions have been determined which permit the use of two or three times as much ammonia as was formerly considered practicable. The result is a considerable saving in raw materials, improvement in physical properties, and a more concentrated product.

Concentrated fertilizer investigations: Developments in the fertilizer industry, particularly the growth of the nitrogen fixation industry, have resulted in the production of very concentrated fertilizer materials which cannot be used indiscriminately in mixtures or in the usual fertilizer drills. The properties of these newer materials must be studied, improvements made where possible, and in some cases methods of manufacture of new fertilizer salts be considered.

A study is being made of the chemical and physical properties of fertilizer materials and mixtures, such as hygroscopicity, stickiness, caking, drillability, etc., with a view to devising means for increasing the storage capacity of fertilizers, reducing handling costs, and increasing the uniformity of their distribution in the field. Unfortunately, many of the newer fertilizer materials have the property of absorbing moisture from the air, first becoming sticky and later forming cakes.

This adds to the cost of handling and interferes with uniform distribution in the field. Methods have been developed whereby caking in some of the materials studied may be partially or wholly prevented. These methods are now applied commercially by a number of manufacturing concerns.

Measurements have also been made of the hygroscopicity of fertilizer materials and mixtures for the purpose of determining which materials go well in mixtures and which do not. The results obtained are now used by fertilizer manufacturers in compounding fertilizer mixtures from the new materials coming on the market.

Drillability tests show that the uniform distribution of fertilizers in the field is affected by many other factors in addition to caking. It has been found that all fertilizers are distributed more or less irregularly by present equipment and that the irregularity of distribution may vary greatly with the same fertilizer in different distributing machines or with different fertilizers in the same machine. It thus happens that some plants receive too great an application of fertilizer for most profitable returns while others receive too little. Field tests this year have shown that when special means were provided for applying a commercial fertilizer greatly increased crop yields were obtained over thosesecured when the fertilizers were applied in the usual way. An improvement in the mechanical properties of fertilizers thus affords a very important means for reducing the expense incident to the use of fertilizers by reducing manufacturing and handling costs. and by increasing the crop returns from a given application of fertilizer. Owing to the rapidity with which new materials are now coming on the market and to the poor mechanical condition of many of them, it is important that more attention should be given to the proper utilization of these materials if serious loss to the farmer is to be prevented.

Most of the fixed nitrogen products contain nitrogen as the only plant food constituent and the properties of many of them, as already stated, greatly interfere with their use in fertilizers. These unfavorable properties can be largely eliminated by causing these materials to react in the process of their manufacture with other fertilizer materials to form products which contain two plant food constituents. Improved methods have been developed for preparing these materials which give promise of commercial application. These materials are not only superior in their mechanical properties to the simple constituent fertilizer materials but they afford a means of greatly reducing the handling, bagging and transportation costs of fertilizers in that they are capable of being compounded into fertilizer mixtures which may contain upwards of four times the plant food content of the average mixed fertilizer. Formulas have been devised for preparing concentrated mixtures of this kind which show as good mechanical properties as the best of the ordinary mixed fertilizers. These fertilizer formulas are now being used by the industry in the preparation of concentrated mixtures.

New and improved methods have been developed for the determination of fluorine, borax and phosphoric acid in fertilizer materials and mixtures. These methods have been adopted by the Association of Official Agricultural Chemists and are in use in numerous laboratories throughout the country.

(k) SOIL SURVEY

Appropriation, 1930	$ 274,000
Budget, 1931	310,000
Increase	36,000

The increase of $36,000 is submitted for the following purposes:

(1) $28,480 for detailed and reconnoissance surveys in cooperating States. The demands made by the States for soil survey work has increased very materially and it is impossible with the present allotment to meet cooperation to the extent offered by the States. Since the last budget was prepared Kentucky, Alabama, Oklahoma, Vermont and Porto Rico have obtained increased appropriations for the work. Washington and New York are expecting additional funds. It is now necessary to assign a smaller number of Bureau men than are put in by several of the cooperating States. Because of the nation-wide character of the soil survey work, scientific leadership must be maintained by the Federal Government in order to secure absolute consistency throughout the country. Unless the Bureau maintains this leadership, it will be difficult if not impossible, later to harmonize the work on a national basis. The ultimate purpose of the soil survey is to classify and map the soils of the nation in order that there may be brought about better adjustment between soil types and crops, fertilizer usage and cultural methods to the end that an efficient agricultural industry may be maintained.

(2) $7,520 for detailed and reconnoissance surveys in the flooded areas of Vermont, New Hampshire, Louisiana, and Mississippi, and other southern States. The disastrous floods in recent years have created an acute situation in the rural sections of certain States, and the increase recommended is urgently needed to assist in working out a new economic system necessitated by the changed and altered conditions of the land in the flooded areas. The Vermont Experimental Station is already engaged in making a land utilization survey and it is essential that the soil survey be completed as rapidly as possible since a knowledge of the soil is essential and basic to any land utilization program.

BUREAU OF CHEMISTRY AND SOILS (Continued)

Project Statement

Project	Expended 1929	Estimated 1930	Estimated 1931	Increase
Detailed and reconnaissance surveys	$194,842	$199,920	$235,920	$36,000 (1-2)
Inspection & Correlation . . .	24,184	27,220	27,220	-
Soil erosion invs.	6,089	-	-	-
Correlation & soil characteristics & crops	5,250	8,260	8,260	-
Map drafting	35,093	38,600	38,600	
	$265,458	$274,000	$310,000	$36,000

Activities under this Appropriation

General

The object of the Soil Survey is to map and classify the soils of the United States andmake this information available to those interested in agriculture. The ultimate purpose is to provide a soil map of the continental United States, which will furnish a foundation of facts upon which to develop a rational permanent agriculture.

Experiment-station and agricultural-college and extension workers use the reports and maps as a basis for the location of outlying experimental fields and in the application of these results to other areas of similar soils in other localities, thus giving a wide range of adaptation of their results to the soils of the county and State.

Another phase of this work concerns the relation of soil types to the development and the spread of plant diseases. During the last field season, researches were begun in the State of Texas with a view to determining the relationship of soil types to the root-rot of cotton. These preliminary studies suggest that there may be a definite relationship between the soil type and the spread of plant diseases.

Detailed and reconnoissance surveys: These surveys identify and classify soil types in the field and their boundaries are indicated on base maps. For the more important agricultural regions, the soils are studied in detail and mapped on a scale of one inch to the mile, while in rough mountainous regions and grazing areas the maps are in much less detail. This work is conducted in cooperation with the States.

Inspection and correlation: In the soil survey work conducted in cooperation with the States, it is necessary that the Federal government serve as the coordinating agency. In order to assure a uniform system of classification, the soil survey maintains a corps of trained inspectors who travel from area to area within their district and constitute a Correlation Committee whose duty it is to see that the classifications in the several States are in harmony with the national system of classifaction.

Correlation and soil characteristics and crops: It is essential that soil characteristics be correlated with land usage in order that there may be brought about a better adjustment between soil types and crops, fertilizer usage and cultural methods. This information is essential to the development of a sound land utilization policy.

Map drafting: After the soil types have been identified and their boundaries outlined on field sheets or base maps, it is necessary to make adjustments and prepare a finished map for the engraver. A corps of experienced draftsmen are employed in this highly technical work.

(1) SOIL EROSION

Appropriation, 1930	$ 160,000
Budget, 1931	160,000

Change in Language

The proviso which made $40,000 immediately available for 1929 has been omitted.

Project Statement

Project	Estimated 1929-1930	Estimated 1931
Soil erosion researches	$ 160,000*	$ 160,000 (a)

(*The sum of $22,155 was expended under the immediately available authority.)

(a) Allotments to the several bureaus from this appropriation:

Bureau of Chemistry and Soils	$ 65,000
Forest Service	30,000
Bureau of Public Roads.	65,000

Activities under this Appropriation
General

Damage from soil erosion includes the removal by rainwash of the rich surface layers of soil with the consequent reduction of productivity, the silting of streams, reservoires and irregation ditches and the destruction or severe impairment of alluvial lands by overwash of sand and gravel.

BUREAU OF CHEMISTRY AND SOILS (Continued)

The objectives of these investigations are to determine accurately the causes of soil erosion; the possibility of increasing the absorption of rainfall upon various types of soil; to devise means to preserve the soil and to prevent or control destructive erosion: to conserve the rainfall by terracing or by other means, and to develop a comprehensive program of soil erosion for the entire United States.

The reconnoissance erosion survey begun last year is being continued and field stations established in Oklahoma, Kansas, and Texas. Studies are being made of sites for three or four additional stations where it is expected that work will be inaugrated before the close of the fiscal year

Measurements are being made at these stations of the losses by erosion, and studies are made of the effect of different cropping systems and different types of terraces on erosion losses and moisture conservation. Laboratory investigations are being made to develop methods for measuring the relation of certain physical properties to the ease or difficulty with which soils erode.

Work under this appropriation of $160,000 is conducted jointly by the Bureau of Chemistry and Soils, the Bureau of Public Roads and the Forest Service, which in turn are cooperating with the States under the general supervision of an Erosion Committee, consisting of three members from the Department of Agriculture and two members from the State Experiment Stations. Of the total appropriations, $30,000 has been alloted to the Forest Service, $65,000 to the Bureau of Public Roads, and $65,000 to the Bureau of Chemistry and Soils.

Under this cooperative arrangement, the Bureau of Public Roads is in charge of all engineering features of the investigations, including plans, the building of terraces, and the developing of terrace-making machinery. The Bureau of Chemistry and Soils is making a reconnoissance survey of the eroded areas, measuring losses and studying the effectiveness of the different systems, terracing and other control measures. The Forest Service is confined to range and forest lands with special reference to the affect of the natural cover in preventing erosion and the reduction of flood damage.

(m) SOIL MICROBIOLOGY

Appropriation, 1930	$43,400
Budget, 1931	43,400

Project Statement

Project	Expended 1929	Estimated 1930	Estimated 1931
Soil microbiology . . .	$ 42,778	$43,400	$ 43,400

Activities under this Appropriation

General

A nation-wide inspection of the legume cultures offered for sale to farmers is made annually. This inspection consists of analyzing cultures in the laboratory for purity and viability, and testing them in the greenhouse and field for ability to produce nodules on the plants for which they are intended. Studies of the activities of soil organisms under different conditions are made in order to secure fundamental information necessary to establish intelligent control.

In connection with this work it is also necessary to study the relationship of the microbial population of the soil to its usefulness in crop production with special reference to the decay of organic matter and the availability of the mineral plant food materials.

(n) SOIL FERTILITY

Appropriation, 1930	$159,000
Budget, 1931	200,000
Increase	41,000

The increase of $41,000 is submitted for the following purposes:

(1) $6,000 for citrus fruits and truck crops in southeastern States. The citrus fruit and truck crop farmers in the southeastern States are confronted with certain serious soil fertility and crop problems. Many of the soils are leachy in nature and are deficient in plant nutrient materials and preliminary experiments show that remarkable results may be obtained from small applications of minor elements of plant-food. The short life of citrus trees grown on the calcareous soils is primarily a soil fertility problem. The extension of soil fertility and fertilizer investigations to other soil types with a view to determining deficiencies and the effect of uncommon elements, such as manganese, copper boron, etc., is essential. Investigations should be made to determine the chemicals necessary to apply to these soils so that satisfactory yields of high quality crops may be obtained.

(2) $5,000 for sugar beet soil fertility studies. The relationship of soil types and fertilizer treatment to sugar beet production have been found to be paramount factors. The newer sugar-beet-growing regions of the central west are urgently requesting the Bureau to extend its soil fertility and fertilizer investigations to those States. The use of commercial fertilizers on sugar beets in the United States is comparatively new to the sugar beet industry. Further experimental work is necessary to determine the proper fertilizer mixtures for different soil types, as well as the residual effect upon crops grown in rotation with sugar beets. Wherever soil fertility experiments have been conducted, an increase of from two to three and even ten tons per acre have been obtained, which reflects an increased revenue of from 10 to 50 dollars an acre.

(3) $20,000 for pecan soil fertility studies: Expansion of soil fertility and fertilizer work on the various soil types on which pecans are grown is very necessary. 1. To determine the influence of fertilizers on yield and filling quality of the pecan. 2. Adaptability to various soil types for pecan growing with special attention given to yield and quality of nut as influenced by soil types. 3. Changes produced in pecan soils by the growing and the decomposition of various green manure crops and their influence on the fertility of pecan soils. 4. Laboratory investigations to determine influence of fertilizers, soil type and cultural practices on quality of nut. It is believed that soil management studies, and the application of proper fertilizers, will remedy many difficulties now encountered. A soil fertility laboratory would be established in the South eastern Pecan Belt for the purpose of serving the industry in that region, similar to the one located in Southwestern Pecan Belt at Shreveport, Louisiana.

(4) $10,000 for cotton root-rot soil fertility and fertilizer studies. Field experiments are now being conducted at twelve locations in the so-called Black Belt of Texas with a view to determining the influence of certain fertilizers and chemicals on cotton root-rot. It has been found that the disease is more prevalent on certain soil types than on others. An expansion of the studies of the soil conditions and fertilizer practices in relation to the control of the root-rot disease of cotton is essential to more quickly accomplishing remedial results.

Cotton root-rot causes tremendous losses annually because complete knowledge of the factors which control the disease is not available, especially the soil fertility factors.

Project Statement

Project	Expended 1929	Estimated 1930	Estimated 1931	Increase	
Soil fertility invs.....	$ 106,127	$ 114,986	$ 145,986	$ 31,000	(1-2-3)
Cotton root-rot soil fertility work	22,257	39,000	49,000	10,000	(4)
Green manuring or soil organic matter invs	-	5,014	5,014	-	
Total.	$128,384	$159,000	$200,000	$ 41,000	

Activities under this Appropriation

General

The duties and functions of the Division of Soil Fertility Investigations comprise a fundamental study of the biochemical relationships existing between soils, fertilizer, and crops. The work is carried on through field, laboratory, and greenhouse studies. The field work is conducted at about 50 localities in the United States; the laboratory and greenhouse studies are carried on at the Arlington Experimental Farm.

Fertilizer and soil fertility investigations are conducted on cotton, corn, sugar beets, sugar cane, potatoes, sweet potatoes, citrus fruits, pecans, peaches, and a number of truck and forage crops. The field work is designed to test; (1) the comparative effectiveness of various fertilizer ratios or formulas, as evidenced by crop response and production; (2) the comparative value of different nitrogen, phosphate, and potash carriers for fertilizer usage; (3) the effectiveness of synthetic nitrogen materials; (4) the economy and crop producing value of concen-

trated fertilizers, and (5) the effect of uncommon soil elements, such as manganese, copper, etc., on plant growth and crop production.

Field and greenhouse studies are made at the Arlington Farm on the action of fertilizer salts in nutritional investigations. All fertilizer mixtures used in the field investigations on prominent soil types throughout the United States are prepared here. In the laboratories are studied the biochemistry of soil organic matter, the composition of soils, fertilizers, and crops; also the fundamental factors which determine soil fertility.

Soil fertility investigations: Shreveport, La. - The work at this Station is restricted to soil fertility and fertilizer work on the growing of pecan trees and the influence of these factors on the yield and quality of the nuts. Both laboratory and field investigations are in progress. This work is in cooperation with the Bureau of Plant Industry and the Bureau of Entomology.

Houma, La. - The work at this Station is confined to soil and fertilizer studies in the growing of sugar cane and the influence of soil and fertilizers on sugar content. A field study of the sugar cane soils of this region is being made with laboratory headquarters at this station. in cooperation with the Bureau of Plant Industry.

Chadbourn, N.C. - At this station soil and fertilizer studies are made in connection with strawberry growing, especially as to the influence of soil and fertilizer practice in the control of certain strawberry troubles which are threatening this industry. Laboratory and field investigations are in progress and attention is also being paid to the influence of soil and fertilizer treatment on both production and quality of fruit. The Bureau of Plant Industry and the Bureau of Entomology are cooperating in this work.

Cotton root-rot and soil fertility work: Austin, Texas - The cotton root-rot investigations at Austin, Texas, comprise three major lines of field work and laboratory investigations to determine (1) the influence of fertilizers, rare elements and soil amendments, (2) the influence of deep and shallow tillage, and (3) the influence of the physical and chemical characteristics of the soil on the root-rot of cotton.

With this station as a center, additional fertilizer and soil amendment experiments are being made at the United States Cotton Breed-

ing Station, Greenville, with the United States Field Station at San Antonio, as well as at the Texas Cotton Root Rot Experiment Station, Temple, and with numerous farmers in the Black land belt.

Considerable increase in the yield of cotton has resulted from the use of fertilizers. Certain fertilizer materials have hastened the growth, the fruiting and maturing of the cotton and delayed the appearance of cotton root-rot. The cotton which was fertilized produced mature bolls, equivalent to one-third to one-half bale of cotton before any root-rot started, while on the unfertilized area no mature bolls had formed when root-rot got under way. These results were most marked on the less alkaline soils of the belt. The effective fertilizers were mixtures high in phosphate and nitrogen, and of the materials studied, Ammonium phosphate and Ammonium sulphate have been most effective. One hundred and fifty to two hundred pounds per acre are sufficient to produce a marked effect.

The tillage experiments under way are showing some promising results. When the heavy, stiff land is subsoiled to a depth of sixteen to eighteen inches and the intermediate area between the surface and this depth chiseled to break up the hard compact mass and permit thorough aeration, considerably less root-rot has appeared. This seems a promising and practical method of controlling cotton root-rot. Heavy-duty tractors and tillage instruments are required for this work.

Our work has shown that there is a marked correlation of root-rot with the character of the soil in the Black land belt. Eroded fields where the subsoil is exposed and where tillage is poor are much more subject to loss of cotton from root-rot than fields which are well terraced and well cultivated. Surveys of definite areas which are spotted with root-rot show that the root-rot has caused most loss where the soil is shallow and the subsoil near the surface. The Bureau of Plant Industry is cooperating in this work.

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Note.- See also Miscellaneous Section for proposed allotment under "Special Corn Borer Research."

BUREAU OF ENTOMOLOGY

Change in Language of Introductory Paragraph

The language in the introductory paragraph has been amended by inserting after the words "economic entomology" the following: "For investigating the history and habits of insects injurious and beneficial to agriculture, horticulture, arboriculture, for studying insects affecting man and animals, and for ascertaining the best means of destroying insects found to be injurious." This language is added to more completely describe the work of the Bureau of Entomology.

The language has been amended further by inserting after the words "individuals concerned" the words "or with Foreign Governments." This language is added to cover cooperative work now under way with the Departments of Agriculture, Commerce, and Labor of the Republic of Cuba, (Second Deficiency Act, Fiscal Year 1929). Since the funds provided under the deficiency appropriation are to be merged with the regular appropriation, it is necessary to include in the latter authority to continue the cooperative work as planned.

(a) GENERAL ADMINISTRATIVE EXPENSES

Appropriation, 1930	$91,000
Budget, 1931	93,000
Increase	2,000

The increase of $2,000 is submitted for the following purpose:

(1) $2,000 to make possible the employment of editorial assistance to expedite the preparation and publication of information in pest control methods developed by investigators of the Bureau. Under present conditions there is considerable delay in making available the results of the investigations on insects.

Project Statement

Project	Expended, 1929	Estimated, 1930	Estimated, 1931	Increase
General administration	$87,501	$91,000	$93,000	$2,000 (1)

Activities under this Appropriation

This appropriation provides for the general business operations of the Bureau, including accounts, audits, supplies, property, personnel, editorial and library.

(b) DECIDUOUS FRUIT INSECTS

Appropriation, 1930	$352,790
Budget, 1931	385,000
Increase	32,210

The increase of $32,210 is submitted for the following purposes:

(1) $8,000 for the enlargement of pecan insect work at Albany, Georgia, to enable the Bureau to increase the experimental work at this station in order to hasten the development of control measures for pecan insects, especially the major pest, the nut case-bearer, which causes serious losses each year.

BUREAU OF ENTOMOLOGY (Continued)

(b) DECIDUOUS FRUIT INSECTS (Continued)

(2) $20,000 to enable the Bureau to collect, rear and ship to the United States parasites of the Japanese and Asiatic beetles from Australia and Europe and which will be useful in the control of these pests in this country. Five species of parasites imported from the Orient have already been successfully established in this country. It is desired to establish a complete sequence of parasites occurring between early spring and late autumn. To accomplish this purpose effectively it will be necessary to import additional species of parasites from new areas.

(3) $4,210 to expand investigations of the Oriental peach moth and the plum curculio under way in southern peach orchards. A very critical situation has developed in reference to damage by these insects, their injuries to the peach crop during 1929 causing very severe losses and it is desired to expand the existing work in order to relieve this situation.

Project Statement

Project	Expended, 1929	Estimated, 1930	Estimated, 1931	Increase
Apple insects.....	$61,033	$61,750	$61,750	- - -
Peach insects.....	23,141	38,780	42,990	$4,210 (3)
Grape insects.....	5,611	6,095	6,095	- - -
Nut insects.....	29,241	30,235	38,235	8,000 (1)
Orchard insecticides & spraying machinery.....	18,499	18,550	18,550	- - -
Orchard insect survey....	3,881	4,025	4,025	- - -
Blueberry maggot.....	15,886	12,155	12,155	- - -
Japanese beetle research.	151,016	149,240	169,240	20,000 (2)
Asiatic beetle research..	15,527	16,170	16,170	- - -
Plant disinfection inv...	10,327	15,790	15,790	- - -
Total.....	334,162	352,790	385.000	32,210

Activities under this Appropriation

General

The funds under this subappropriation are used for the investigation of, and development of control measures for, insects injurious to deciduous fruits, including nuts, grapes, certain small fruits and also research on Japanese and Asiatic beetles. Field laboratories are maintained in the principal fruit-growing regions of the country.

BUREAU OF ENTOMOLOGY (Continued)

(b) DECIDUOUS FRUIT INSECTS (Continued)

Apple insects: Under this project are investigated the many insect pests of the apple, as the codling moth, plum curculio, apple maggot, canker worms, apple tree borers, scale insects, plant lice and the like. During recent years particular attention has been given to detailed studies of the biology and behavior in orchards of the codling moth and to tests in the laboratory and orchard of insecticides which might be substituted for arsenate of lead in view of the dangerous character of this poison from the spray residue standpoint. This work is in progress in New Jersey, Arkansas, Kansas, Washington State, etc. In addition special investigations relating to the spray residue problem are being carried out in cooperation with the Bureau of Chemistry and Soils, in the laboratory in Washington, and in nearby Maryland. One of the recent accomplishments under this project is the adaptation of the use of lubricating oil emulsion for the control of the San Jose scale, which is now extensively used by commercial apple and peach growers.

Peach insects: Under this project are conducted life history studies of the more important insects attacking the peach in the Southeast, such as the curculio, peach tree borer, oriental peach moth, San Jose scale, etc. Extensive experiments are conducted in orchards with insecticides and other measures for the control of these several pests. Special attention is being given to the oriental peach moth and plum curculio in view of the serious damages resulting from their activities at this time.

Grape insects: Work under this project includes life history studies of the various insect pests of the grape, as berry moth, leafhopper, root worm, etc. Headquarters are maintained at Sandusky, Ohio, convenient to the large grape industry along Lake Erie in Pennsylvania and Ohio. The necessity for heavy spraying with arsenicals for the control of the berry moth and root worm has resulted in a very distinct spray residue problem, and much time is being devoted to determining insecticides which will be satisfactory for the control of the insects and not objectionable from the residue standpoint.

Nut insects: Under this project are carried out biologic studies of the more important insects attacking pecans, chestnuts and hazelnuts. Insects of the chestnut are studied at the French Creek, W. Va., laboratory and headquarters for pecan insect work is located at Albany, Ga. Three sublaboratories are maintained for pecan insect investigations, at Experiment, Ga., Shreveport, La. and Brownwood, Texas, to provide for the study of pecan pests locally abundant and to develop treatments effective under various climatic conditions.

BUREAU OF ENTOMOLOGY (Continued)

(b) DECIDUOUS FRUIT INSECTS (Continued)

Orchard insecticides and spraying machinery: This project deals primarily with fundamental investigations of insecticides for use in orchards and elsewhere, and at this time is directed especially towards finding a substitute for arsenate of lead, a poison objectionable for use on food products. The experiments also include the determination of the relative toxicity and intimate action of contact insecticides. The results of laboratory studies are often the basis for carrying out large scale experiments in the field with materials which have been found to be hopeful or effective.

Orchard insect survey: Work under this project involves the collection of information relative to the status and injuries of various orchard pests not regularly very destructive, but which may become so at any time. The life histories and habits of various species are investigated and tests made with remedies where feasible.

Blueberry maggot: Work under this project consists of life history studies of this very serious insect pest of the blueberry, as well as carrying out large scale experiments with insecticides in blueberry barrens to determine the most effective and economical means of controlling the pest. Headquarters are maintained in Washington County, Maine, in the heart of a large blueberry industry.

Japanese beetle research: The work under this project consists of life history studies of this insect, and large scale experiments with various insecticides to determine the most effective and economical means of controlling the beetle in its various stages. Attention is being given to ascertain the effect on the insect of local conditions, climate, etc. As the beetle spreads to other districts, such as Virginia, Massachusetts and Maryland, these ecological studies are especially necessary and will also take account of the influence on the insect of crop conditions and practices as affecting its food supply, the effect of soils and other factors. Considerable work has been accomplished with repellent materials, but further studies will be required in this comparatively unworked field before satisfactory materials can be recommended. Special attention is being given to the search in foreign countries for parasites of the insect, and six species of these beneficial forms have already been introduced, five of which are firmly established. Two or three species give special promise in view of their adaptability and fecundity. One of the recent accomplishments under this project deals with the use of lead arsenate as a soil insecticide against the larvae of this insect, which is being successfully employed by nurserymen in treating their plants so that they may receive approval for shipment into noninfested areas. Lead oleate arsenate of lead is also being successfully used for the control of the beetles on trees and plants.

BUREAU OF ENTOMOLOGY (Continued)

(b) DECIDUOUS FRUIT INSECTS (Continued)

Asiatic beetle research: The work under this project consists of life history studies of this insect, as well as experiments to determine the most effective and economical means of controlling it. As in the case of the Japanese beetle, considerable attention is being given to parasites of this insect.

Plant disinfection investigations: Work under this project consists of thorough-going studies of insecticides and other materials which may be used for the disinfection of plants and plant products from injurious insects. It is planned that this work in cooperation with other Divisions of the Bureau will eventually cover the entire field of products subject to insect attack which may enter foreign and domestic commerce, which information will be especially useful to those concerned with plant quarantine operations. Studies under way relate to the employment of hot water, naphthalene, carbon bisulphide, hydrocyanic-acid gas, etc.

(c) SUBTROPICAL PLANT INSECTS

Appropriation, 1930:	
Facial	$130,500
Balance available for black fly parasite work provided by Second Deficiency Act, 1929	6,000
Total available, 1930	136,500
Budget, 1931	166,500
Actual increase	30,000
(Apparent increase	36,000)

The increase of $30,000 is submitted for the following purposes:

(1) $25,000 for undertaking experiments relating to the control of resistant scale insects affecting citrus. For many years the principal method of control of citrus scale insect pests in California has been by fumigation of the trees with hydrocyanic-acid gas. Due to unknown causes the insects have become resistant to the gas and growers are now unable to secure control of scale pests necessary to protect the trees with the consequence that very serious damage to the industry results. The funds will be utilized for a reinvestigation of fumigation methods including new combinations of gases and an attempt to devise other remedies which may be cheaper or more effective. The Bureau of Chemistry and Soils will cooperate in this work.

BUREAU OF ENTOMOLOGY (Continued)

(c) SUBTROPICAL PLANT INSECTS (Continued)

(2) $5,000 to investigate the life history, habits and means of controlling the cyclamen mite. The loss caused by this mite, especially to growers of cyclamen, begonia and chrysanthemum constitutes a new type of crop damage and is the outstanding pest problem connected with the production of these crops. It has become increasingly injurious and losses from its attacks during the last year aggregate over one million dollars. It is believed that investigation of control measures will develop means of preventing much of this loss.

Project Statement

Project	Expended, 1929	Estimated, 1930	Estimated, 1931	Increase
Citrus insects in Gulf Region	$14,585	$20,711	$20,711	- - -
Greenhouse insects.....	18,232	18,405	23,405	$5,000 (2)
Bulb insects.....	15,385	22,940	22,940	- - -
Fruit flies in Hawaii.....	7,772	8,025	8,025	- - -
Fruit flies in Canal Zone....	3,710	3,740	3,740	- - -
Insects affecting miscellaneous ornamentals.....	13,723	13,884	13,884	- - -
Citrus insects in California	5,042	9,235	34,235	25,000 (1)
Mexican fruit worm.....	34,896	35,860	35,860	- - -
Parlatoria date scale research	3,657	3,700	3,700	- - -
Total.....	117,002	136,500	166,500	30,000

Activities under this Appropriation

General

The work under this appropriation deals with the insect pests affecting citrus, avocado, guava, loquat, date and other subtropical fruits, together with the pests affecting various ornamental plants grown both in the greenhouse and out of doors. The research is concerned with the habits and development of these insects and the determination of methods which may be used by growers in controlling the pests which affect their crops.

BUREAU OF ENTOMOLOGY (Continued)

(c) SUBTROPICAL PLANT INSECTS (Continued)

Citrus insects in Gulf Region: The work under this project includes investigation of the behavior, injury, and natural and artificial control of the principal insects affecting citrus, including the red spider, rust mite, scale insects and white flies. Recent accomplishments under this project include the determination of a practical remedy for controlling the red spider and eliminating the undesirable russet condition which it causes on oranges. A search for parasites of the black and white flies of citrus is now under way in the Straits Settlements, and preliminary indications are that some promising natural enemies of these insects have been discovered. The colonization of these beneficial parasites of the black fly will be undertaken in Cuba in cooperation with the Cuban Department of Agriculture, and in Florida in the case of the white fly. Owing to the recent emergency connected with the invasion of Florida by the Mediterranean fruit fly, the major part of the personnel under this project has been engaged on research investigations connected with the effort which is being made to eradicate this insect. This work is conducted in cooperation with the Plant Quarantine and Control Administration.

Greenhouse insects: This project is concerned with investigations of various insects, such as aphids, mites and white flies, which injure ornamentals grown under glass, and with detailed investigations of fumigants, sprays and dusts, etc., which are utilized in controlling these insects.

Bulb insects: The work under this project deals with investigating the development and control of the insect pests affecting bulbs which are subject to quarantine. Attention is being given principally to the development of remedies which will permit the treatment and certification for shipment to noninfested areas of bulbs produced by American growers.

Fruit flies in Hawaii: The work under this project has dealt mainly with a study of the natural control of these insects by parasites and the determination of the fruits which may be injured by the flies. Since the recent introduction of the Mediterranean fruit fly into the continental United States, the work under this project has been concerned principally with investigating the treatment of fruit to free it from infestation by the fruit fly. This work is of great use in aiding the eradication program in Florida by contributing to research which will insure the safe movement of fruit.

Fruit flies in Canal Zone: The work under this project is concerned with an investigation of the various fruit flies known to occur in Central America and to determine their habits, host fruits, and methods by which they might gain access to the United States. This project is of great potential importance to the fruit growers of this country, as it is pointing the way to more effective methods of excluding these injurious fruit pests from the United States.

BUREAU OF ENTOMOLOGY (Continued)

(c) SUBTROPICAL PLANT INSECTS (Continued)

Insects affecting miscellaneous ornamentals: The work under this project covers the investigation of all insect pests affecting ornamental plants other than those classed as shrubby ornamentals. At the present time the principal attention is given to research on the development, habits and methods of controlling the camphor scale, an injurious pest of many plants which occurs in Louisiana, Mississippi and Alabama. A fundamental study of oil sprays is also under way and this work has developed new and useful facts in the preparation of this insecticide and has served to perfect its use not only for the control of this insect but to lead to the wider adaptation of this cheap insecticide to the other insect problems.

Citrus insects in California: The work under this project is concerned with the investigation of the principal citrus insects in California and the southwest includes such destructive forms as scale insects, mealybugs and the citrus thrips. Recent developments under this project include devising a dusting method for the control of the citrus thrips which is being used by some of the citrus growers with success.

Mexican fruit worm: The work under this project includes research on the Mexican fruit worm, including the determination of its habits, development, host plants and methods of control. Since an eradication campaign on this insect is now under way in Texas, the research laboratory has been located in Mexico where the insect is present in numbers and where the various phases of research can be carried on without interruption. While it is hoped that this insect may be kept out of the United States, the close proximity of the citrus area of Texas to Mexico makes it necessary that a study of the insect be continued so that effective control measures for this pest will be available should the insect ever gain a permanent foothold in this country.

Parlatoria date scale research: The investigations of this project are concerned with a complete study of the date scale and the development of effective control measures which may be used as a supplement to the torching method which is now being used in connection with the eradication campaign being carried on against this insect. Owing to the drastic nature of the torching method, it is important that some supplemental and milder treatment be devised which can be used on palms surrounding the infested area and thus give greater assurance of eradication without placing undue burden on the growers.

BUREAU OF ENTOMOLOGY (Continued)

(d) TRUCK CROP INSECTS

Appropriation, 1930	$278,560
Budget, 1931	315,000
Increase	36,440

The increase of $36,440 is submitted for the following purposes:

(1) $25,000 to enlarge investigations of wireworms in the Pacific Northwest. Coincident with the development of agriculture in the reclamation projects and the extensive culture of such crops as potatoes, onions, beans, and melons, the damage from wireworms has gradually increased until at the present time they constitute a serious menace to agriculture over the irrigated districts of the entire Pacific Northwest. These insects have in many instances forced growers to abandon the culture of truck and other cash crops in favor of the less profitable practice of general farming with the result that the effective development of some of the reclamation projects is seriously retarded. Unless some remedy is developed within a short time the activities of these pests will gradually reduce the production of the higher priced cash crops which are necessary to the successful development of these fertile irrigated lands.

(2) $7,500 to develop control methods for the lima bean pod borer which has within recent years become a pest of major importance in the dry bean producing areas of the West Coast. Losses from this insect have increased steadily. In 1926 growers in the affected regions lost as much as $2 per hundred pounds or about one-third of the cannery price of beans because of damage by this pest. Owing to the manner of feeding upon the plant this insect can not be combated by the methods commonly practiced against injurious insects and the complete study of the seasonal activities of the pest on wild and cultivated hosts is necessary to the development of practical methods leading to its control on beans.

(3) $3,940 for furthering the investigation for developing control measures for the strawberry root aphis, an insect associated with an obscure disease which is seriously affecting the production of strawberries in the Southeastern United States. Since the disease-like condition which affects the plants and stops fruiting may result from a combination of insect, unfavorable soil conditions, and disease, this investigation will be undertaken in cooperation with the Bureaus of Plant Industry and Chemistry and Soils.

BUREAU OF ENTOMOLOGY (Continued)

(d) TRUCK CROP INSECTS (Continued)

Project Statement

Project	Expended, 1929	Estimated, 1930	Estimated, 1931	Increase
Miscellaneous truck crop ins.	$64,368	$64,760	$64,760	- - -
Pea insects	8,634	8,760	8,760	- - -
Sweet potato weevil control .	41,733	42,557	42,557	- - -
Berry insects	5,310	7,370	11,310	$3,940 (3)
Soil insects	28,250	33,475	58,475	25,000 (1)
Sugar beet insects	30,058	48,111*	48,111*	- - -
Tobacco insects	27,476	27,627	27,627	-----
Bean insects	34,470	39,700	47,200	7,500 (2)
Mushroom insects	5,897	6,200	6,200	- - -
Total	264,196	278,560	315,000	36,440

* For 1930 and 1931 supplemented by $69,974 from special appropriation in Miscellaneous Section of Agricultural Act for Sugar Beet leaf hopper.

Activities under this Appropriation

General

The work carried on under this appropriation includes investigations of and the development of remedies for insect pests of truck and garden crops including peas, beans, potatoes, sweet potatoes, cabbage, etc., and such related crops as sugar beets and tobacco. It also includes work on the European earwig and pests of the cultivated mushrooms. Soil insects such as wireworms together with the pests which attack berries are also included under this item.

Miscellaneous truck crop insects: Under this project life history and control studies are conducted on such important insect pests of the vegetable crops as the cucumber beetles, the Seed-corn maggot, the vegetable and pepper weevils, the potato leafhopper, Porto Rican mole cricket, plant lice, the celery leaf-tyer and the European earwig. The control investigations consist of field and laboratory tests with contact and stomach poisons, baits, and traps. Cultural practices as a means of reducing insect injury is also included in the program of work on control. The detailed studies of the life history and seasonal habits of the different pests are made as an aid to the development of control measures. Field work under this project is now being conducted in California, Louisiana, North Carolina, Washington, Florida, and Mississippi.

Pea insects: The work under this project is devoted for the most part to a study of the control of the pea aphid, a widely distributed pest which affects during some seasons not only the crop which is grown for market and cannery purposes but the seed crop. Investigations are now being carried on to determine the factors which surround outbreaks of the aphids and also on the natural factors which influence the activity of the pest throughout the season.

BUREAU OF ENTOMOLOGY (Continued)

(d) TRUCK CROP INSECTS (Continued)

Sweet potato weevil control: This work consists of the investigation and large scale testing of cultural practices in relation to the control of the sweet potato weevil. The results so far have shown that the sweet potatoes can be grown successfully in the presence of the weevil if certain precautions are taken as regards the source of seed, proper selection of the field, clean harvesting and proper storage. Rigid inspection of material brought in from infested areas, however, is necessary in order to keep the areas cleaned free from weevil reinfestation.

Berry insects: Under this project work is being conducted on the strawberry root aphid, the strawberry weevil and certain plant lice which are responsible for the distribution of plant diseases of brambles. Work on the strawberry root aphid and an associated disease has been initiated on a small scale in the Carolinas in cooperation with the Bureaus of Plant Industry and Chemistry and Soils, the object being to determine as soon as possible all of the factors which are responsible for the diseased condition of the strawberry plants and to develop control measures. The work on plant lice as transmitters of bramble diseases, is concerned with the insects seasonal habits together with its wild host plants which may be a source of infection to berry plantings. The work on the strawberry weevil deals mainly with the habits of the pest which might have a bearing on clean-up measures as a means of reducing injury by this pest.

Soil insects: The activities under this project consist of investigations of wireworms which are underground pests of important crops in certain sections of the country, particularly in the irrigated areas of Washington, Oregon, Idaho and California. The investigation includes a study of the life history and seasonal habits of these pests together with soil and crop conditions which affect their development. Soil fumigants as direct control measures have been given extensive tests both alone and in combination with baits. Carbon disulphide applied directly to the soil at a depth of about four inches at a time when the wireworms are near the surface and the soil is in a good tillable condition is the most effective remedy developed so far. However, this method of control is too expensive for use except on exceptionally valuable crops. Efforts are being concentrated on the development of a crop rotation which will permit susceptible crops to be grown successfully.

Sugar beet insects: The work under this project deals mainly with the sugar-beet leafhopper, an insect which is responsible for the transmission of a disease known as curly-top to the sugar-beet plant. Certain other vegetable crops when attacked by the leafhoppers are also susceptible to this disease. This insect is the limiting factor in the development of the sugar-beet industry in the intermountain area and California and has caused enormous losses from time to time. Extensive studies are being made on the natural factors both physical and biological which have a bearing on outbreaks of this insect in several of the seriously affected areas.

BUREAU OF ENTOMOLOGY (Continued)

(d) TRUCK CROP INSECTS (Continued)

Work is also being carried on with direct control measures. A useful development on this project has been the collection of data, which furnishes a basis for determining in advance the probable seasonal abundance of the pest. The result has been of decided benefit to the growers in certain areas since it enables them to plan crop plantings so as to avoid the more severe losses from the pest. Another activity which is being pushed as rapidly as possible is the location of areas in which the leafhopper can not exist in injurious numbers and which therefore appear satisfactory for the development of a stable and successful sugar industry. The funds for this investigation are supplemented by $69,974 carried under the Miscellaneous Section of the Bill "Special Leafhopper Research."

Tobacco insects: Under this project is investigated the control of certain insects of tobacco such as tobacco hornworms, flea beetles, tobacco stalkborer, and budworms. The work on control studies consists mainly of tests with non-arsenical insecticides. Poison baits show some promise of being useful against the hornworm moths, the parents of the worms. While an attractive bait has been found for the moths, difficulty has been encountered in finding a poison which will kill them rapidly after they have fed on the bait.

Bean insects: Investigations under this project consists primarily of the development of control measures against such important bean pests as the Mexican bean beetle, and the bean leafhopper. Work on the control of the Mexican bean beetle in the East has progressed to the point where serious damage from the pest can be checked by the careful and timely use of certain arsenical poisons, especially on the commercial crop. Efforts are being made to develop a non-arsenical remedy to avoid the arsenical residue hazard. An investigation on the introduction of parasites from Mexico into this country is also under way, as a possible means of checking damage by the bean beetle. Investigations are under way on the control of the Mexican bean beetle in the West where the low acre value of the crop makes cheaper remedies necessary. A study is being conducted on the control of the bean leafhopper by the use of Bordeaux mixture and copper-lime dusts, particular attention being directed as to how these materials affect the insect.

Mushroom insects: The work under this comparatively new project consists primarily of the development of fumigants which can be used economically in the control of the mushroom flies, the immature forms of which cause serious damage to the spawn in the mushroom beds before it starts to produce and to the mushrooms themselves. Studies on sanitation and the use of steam as a sterilizing agent between crops are being carried on as a possible means of controlling mites and other pests which are becoming prevalent in mushroom houses.

BUREAU OF ENTOMOLOGY (Continued)

(e) FOREST INSECTS

Appropriation, 1930	$204,000
Budget, 1931	220,000
Increase	16,000

The increase of $16,000 is submitted for the following purposes:

(1) $10,210 for investigating the control of tree-killing bark beetles in the Western States. Several species of bark beetles destroy annually over five billion board feet of marchantable timber valued at approximately $20,000,000. To make it economically possible to prevent these vast losses and protect the reserve stands of timber in the National Forests and on private timber lands, it is necessary that cheaper and more effective methods of control be devised. This object can only be obtained through more detailed investigation of the habits of these beetles and more extensive testing of new control methods in several areas in which these insects are causing extensive timber losses. This is the purpose of this increase, which is authorized by section 4 of the McNary-McSweeney Act approved May 22, 1928 (U.S.C., Supp. III, title 16, sec. 581c).

(2) $5,790 for investigating the control of insects injuring shade and park trees. The insects attacking these trees cause a tremendous loss, one that it is practically impossible to estimate in terms of dollars alone. Very little positive information is available on remedies for these insects and it is impossible to give the advice which would keep this insect injury at a minimum. The increase of $5,790 is to be used for obtaining needed information in this field.

Change in Language

The language under this subappropriation has been amended by inserting after the word "forests" the following: "under section 4 of the Act approved May 22, 1928 (U.S.C., Supp. III, title 16, sec. 581c), entitled An Act to secure adequate supplies of timber and other forest products for the people of the United States, to promote the full use for timber growing and other purposes of forest lands in the United States, including farm wood lots and those abandoned areas not suitable for agricultural production and to secure the correlation and the most economical conduct of forest research in the Department of Agriculture, through research in reforestation, timber growing, protection, utilization, forest economics and related subjects,' $21,000; for insects affecting ornamental trees and shrubs, $10,000; in all $220,000," in order to more clearly describe the activities conducted under this subappropriation and to indicate the activities which are carried under the authority of the McNary-McSweeney Act.

BUREAU OF ENTOMOLOGY (Continued)

Project Statement

Project	Expended, 1929	Estimated, 1930	Estimated, 1931	Increase
Insects affecting forest trees....	$29,364	$29,390	$29,390	- - -
Insects affecting forest products	6,173	6,220	6,220	- - -
Shade tree and hardy shrub insects	4,193	4,210	10,000	$5,790 (2)
Cooperative forest insect control	45,028	54,300	64,510	10,210 (1)
Insects in National Parks	9,580	10,000	10,000	- - -
Gipsy and brown-tail moths research	97,772	99,880	99,880	- - -
Total	192,110	204,000	220,000	16,000

Activities under this Appropriation

General

The projects listed under this heading deal mainly with the investigation of insects affecting forest trees or products derived from them and the development of methods for their control. Work is also under way on the insect enemies of shade trees and hardy ornamentals.

BUREAU OF ENTOMOLOGY (Continued)

Insects affecting forest trees: The work under this project consists of the investigation of insects injurious to forest trees in the eastern United States. Cooperation with several of the Forest Experiment Stations is conducted with the chief objective of devising means for growing future timber crops free from serious insect damage. Such problems as the larch sawfly, white pine weevil, and the southern pine beetle are under investigation. Field headquarters are established in Massachusetts, North Carolina and Michigan.

Insects affecting forest products: Work under this project consists of the investigation of insects affecting crude and finished forest products, such as cross ties, poles, lumber, and woodwork of buildings. At the present time the major work under this project is concerned with the investigation of termites, including their habits, nature of injury, and methods of control. Experimental grounds for testing out various chemicals for prevention of attack by these insects are maintained at East Falls Church, Va., and in the Canal Zone, Panama.

Shade tree and hardy shrub insects: Work under this project consists chiefly of the dissemination of available information on the control and prevention of insect damage to shade trees. Hundreds of inquiries are received each year from all over the country which are taken care of through headquarters in Washington, D. C. Owing to the small allotment of funds for this project no research is now under way.

Cooperative forest insect control: Work under this project consists of investigations leading to the development of more effective control measures for forest insects, particularly the pine beetles which destroy the reserve stands of mature timber. The work is concentrated at three field stations in the western United States. Over half of the available funds are utilized for the purpose of extending cooperation and technical advice to other federal agencies administering timberlands and to private timberland owners. The technical direction of large control projects conducted by these agencies is handled under this project.

Insects in national parks: The activities under this project are similar to those under Cooperative Forest Insect Control, with the exception that the money is specifically provided for work in the national parks. The work is conducted in cooperation with the National Park Service and technical advice is furnished on the handling of their problems.

Gipsy and brown-tail moths research: The most important activity under this project is the collection, introduction, and liberation of European parasites of the gipsy, brown-tail and satin moths. These are European insects and it is necessary to obtain natural enemies from their native regions. Spraying and dusting, tree banding, and other methods of controlling these insects by direct means are also being investigated.

BUREAU OF ENTOMOLOGY (Continued)

(f) CEREAL AND FORAGE INSECTS

Appropriation, 1930:	
Facial	$470,620
1928 balance of unexpended corn borer appropriation reappropriated for 1930, transferred from "Miscellaneous Section" where special corn borer research item is reduced accordingly	40,000
Total	510,620
Less amount expended in 1929, of the $8,000 made immediately available for Mormon cricket control	4,612
Amount available, 1930	506,008
Budget, 1931	535,000
Actual increase	28,992
(Apparent increase	64,380)

The increase of $28,992 is submitted for the following purposes:

(1) $10,000 for the investigation of leafhoppers and other insects involved in disease-like injury to alfalfa, clover, and similar forage legumes. It is proposed under this requested increase to strengthen the inadequate investigation now under way on the insects believed to be responsible for serious damage to these crops in many parts of the country. This malady commonly known as "alfalfa yellows" or "clover spot" is a new trouble for these valuable forage crops and soil builders and has been reported as destructive from Kansas eastward through Illinois and Wisconsin and as far East as Virginia.

(2) $10,000 for investigating the control of the range caterpillar. This insect is the most formidable insect enemy of the valuable blue gramma grass ranges in New Mexico and the pan handle of Texas. The cattle will not eat the grass where this caterpillar has crawled or fed because of the webs spun by it, in which are incorporated its shed skins and poisonous spines. Recent surveys show unmistakably that an outbreak of several years' duration is now in progress and that a cycle of severe injury has already begun. It is believed that the multiplication and colonization of its native parasites will aid materially in controlling this outbreak.

(3) $4,380 to investigate the habits and control of the alfalfa weevil in southern Oregon. While this insect has been present in certain portions of the intermountain region for a number of years it has invaded southern Oregon within the past season. At the latter place its behavior is somewhat different than in the older infested area and in view of the importance of the alfalfa crop in the newly invaded area it is planned to develop control measures which will facilitate the control of the pest in the newly invaded districts.

(4) $4,612 for Mormon cricket investigations. While this item appears as an actual increase for 1931 it is in reality an apparent increase, since of the $8,000 carried in the 1930 Act $4,612 was expended in 1929, and of the $8,000 estimated for 1931 it probably will be necessary to expend about the same amount in the last part of the fiscal year 1930.

BUREAU OF ENTOMOLOGY (Continued)

Project Statement

Project	Expended, 1929	Estimated, 1930	Estimated, 1931	Increase
Cereal insects	$34,857	$35,250	$35,250	- - -
Forage insects	54,651	58,645	78,645	$20,000 (1-2)
Grasshopper control	29,927	32,368	36,980	4,612 (4)
Alfalfa weevil	26,475	26,485	30,865	4,380 (3)
Hessian fly	34,663	35,310	35,310	- - -
Chinch bug	17,436	17,770	17,770	- - -
European corn borer research	223,903	267,320*	267,320	- - -
Sugar cane and rice insects.	31,398	32,860	32,860	- - -
Total	453,310	506,008*	535,000	28,992

*Includes $40,000 for corn borer parasite work carried under miscellaneous section of Agricultural Act as a reappropriation for 1930; transferred to "Cereal and Forage Insect" appropriation in 1931 Budget.

Activities under this Appropriation

General

The activities carried on under this subappropriation consist of investigations of the insects affecting cereal and forage crops, including sugar cane and rice. They include also the research work on the European corn borer and the conduct of a control campaign directed against the Mormon cricket in Colorado. The service provided by this work is distributed throughout practically all of the important corn, small grain and forage producing States in the Union. It also provides for the collection and introduction of the parasitic enemies of introduced cereal and forage insect pests from Europe, Asia, and South America.

Cereal insects: The work done under this project consists of investigations of many insect pests of the various cereal grains - except rice - including such enemies as the billbugs, white grubs, wireworms, cutworms, wheat midge, jointworms, rootworms, sod webworms, corn ear worm, the larger and the Southwestern corn borer, and many others. This work is distributed over more than twenty States and is included in the activities of ten or more field laboratories. Owing to the many species included in this project and the fact that these occur in large numbers only intermittently from year to year, the investigations are necessarily varied to take advantage of prevailing conditions but it is seldom possible to make a complete study of any one species in a single effort. As many of the cereal insects are also enemies of forage crops, this work is closely integrated with the project on Forage Insects.

BUREAU OF ENTOMOLOGY (Continued)

Forage insects: The work under this project consists of a study of the principal insect pests (except grasshoppers) of alfalfa, clover, the various cultivated and wild grasses, and such other crops as cowpeas, soy beans, vetch, sunflowers, and the grain sorghums used for forage purposes. Among the principal insect pests studied are the alfalfa weevil, clover-leaf weevils, clover-flower midge, alfalfa seed chalcis, sorghum midge, sorghum webworm, billbugs, numerous leafhoppers in their relation to the diseases of alfalfa and clover, the alfalfa butterfly, the agricultural ants, and many others. These investigations are distributed principally over the Central and Western States and are part of the activities of at least ten field laboratories. At present, attention is being concentrated on the enemies of alfalfa in the States west of the Mississippi River. The alfalfa weevil is being investigated in its newly occupied territory of western Oregon and western Nebraska.

Grasshopper control: The work under this project consists of investigations to improve or perfect the present methods for combating grasshoppers of various species throughout the country. During the past year an outbreak of considerable proportions developed in Texas, where the staff maintained partly under this project aided in the control work. In the work now under way, each species of grasshopper known to be principally injurious is being carefully studied to determine whether outbreaks of it can be anticipated and forestalled, thus reducing damage and cheapening control operations. The staff engaged in this work also is supervising the campaign against the Mormon cricket in northwestern Colorado, where the insect has originated in public lands and has attached the crops of the ranchers.

Alfalfa weevil: The work under this project consists of a thorough study of the alfalfa weevil, an introduction from southern Europe. The insect is known to be present throughout Utah, Nevada, Wyoming, Idaho, Oregon, northeastern California, and northern Colorado. It recently invaded western Nebraska and undoubtedly will make its way into the great alfalfa-growing sections of the Mississippi Basin. The grubs of this pest eat the leaves of the alfalfa. A poison spray has been developed which is effective but which has to be modified in application, etc., for new localities. Parasitic enemies have been introduced since 1912 and one of these is of considerable help in the older infested localities [illegible]. The headquarters for the work is at Salt Lake City, Utah

Hessian fly: The work under this project consists [illegible] going investigation of the Hessian fly in all of the prin[illegible] sections of the country. The most important service perf[illegible] stations is the semi-annual surveys of Hessian fly condit[illegible] the winter wheat regions to determine the current status [illegible] results of this work are transmitted to the experiment sta[illegible] us States involved, which take any necessary control action o[illegible]. Owing largely to this service, there has not been a genera[illegible] Hessian fly in the Wheat Belt for more than ten years, whe[illegible] years such outbreaks averaged only six years apart.

BUREAU OF ENTOMOLOGY (Continued)

Chinch bug: The work under this project consists entirely of a study of the chinch bug and its natural enemies and methods of control. It is in progress chiefly in the East and West Central States. Since winter wheat was adopted almost generally in this area, this insect has become mostly a corn pest. Its eggs are laid largely on wheat but as the winter wheat ripens before the bugs can become mature they migrate to the corn and the methods of combat have been arranged to take advantage of this fact. Various ditch-barriers and traps have been developed and some of these have proved effective. Experiments are under way to cheapen and perfect the old methods and to devise new ones.

European corn borer research: The work under this project consists of a comprehensive investigation of the European corn borer, the importation of its principal parasitic enemies from Europe and Asia, and their establishment in this country. This involves the operation of five domestic field laboratories, four of which are located in the Great Lake region, Parasite laboratories, are located in France and Japan, where useful parasitic enemies are collected, studied, and shipped to America for colonization. The experimental work has shown that the pest can be greatly reduced by the adoption of such modifications of farm practices, as low cutting of the crop, clean plowing, and the disposition of crop debris by feeding or burning before June 15 each year. Efforts are being made to originate an insecticide which would enable the individual farmer to protect his crop and several promising chemical combinations have been found which are being given careful trials. Several of the parasites originally introduced into New England about 1913 and 1914 have become so numerous as to permit collection and reshipment to Michigan and Ohio. Large numbers of parasites consisting of promising species have been received from Japan and Korea during the past summer.

Sugar cane and rice insects: The work under this project consists of studies of sugar cane and rice insect pests including the sugar-cane moth borer, the sugar cane beetle, and the insects suspected of carrying diseases of sugar cane, such as the root-aphids and other sucking and subterranean species. An effort is being made to import the insect parasites of the sugar-cane moth borer from South America, where in the Argentine and in Peru these parasites are far more numberous than elsewhere. A laboratory has been established in the Argentine for this purpose where the parasites are being collected and shipped to the United States in large numbers. In the study of the enemies of rice in Louisiana it has been necessary to include the insect pests of some of the important rotation plants such as soy beans, because this crop which has been strongly recommended by the Department was found to be attacked seriously by blister beetles.

BUREAU OF ENTOMOLOGY (Continued)

(g) COTTON INSECTS

Appropriation, 1930 (unexpended balance of appropriation of $5,000,000 for establishing and enforcing non-cotton zones, reappropriated for 1930).....$303,120
Budget, 1931 303,120

Project Statement

Project	Expended 1929	Estimated 1930	Estimated 1931
Cotton boll weevil	$172,049	$173,340	$173,340
Miscellaneous cotton insects.....	56,559	58,790	58,790
Arizona weevil	32,299	35,185	35,185
Pink bollworm	19,571	35,805	35,805
Total	$280,478	$303,120	$303,120

Activities under this Appropriation

General

The money appropriated under this heading is used for the investigation of insects injurious to the cotton crop, with a view to the development of practical control measures, or, where such appears to be feasible, the development of methods of eradication.

Cotton bool weevil: The work under this project consists in a study of the habits of the boll weevil in different parts of the Cotton Belt, especially with reference to migration and hibernation and their influence on control practices; in improving the poison method of control, which involves the development of different types of machinery and consequent modification of methods of application; and in searching out new methods of control. One of the features of this work is the testing of control suggestions received from various sources. In South Carolina and Oklahoma, a plan is in operation in which the abundance and activity of the boll weevil is observed and noted each week in representative districts, and the facts immediately passed on to the planters to guide them in their control operations.

Miscellaneous cotton insects: Under this project studies are carried on concerning various cotton pests such as the cotton louse, flea hopper, leafworm, bollworm, red spider, and other species of minor importance. The cotton leaf perforator is being investigated in the Imperial Valley of California, and the other work is being done mainly in Louisiana and Texas. The cotton louse problem is receiving special attention because this pest is becoming more destructive and its injury is at times intensified by the heavy use of calcium arsenate against the boll weevil. An effort is being made to develop a system of poisoning which will effect control of both the boll weevil and boll worm.

BUREAU OF ENTOMOLOGY (Continued)

Arizona weevil: The work under this project consists of investigations of the western form of the boll weevil, which breeds normally in wild cotton, but is now invading the cultivated crop. The relationship between the wild cotton, the insect, and cultivated cotton is being studied. Determination is being made of what ultimate damage to the western cotton crop may be expected from its depredations and what control measures are practicable.

Pink boll worm: The work under this project consists of studies of the activities of this pest both in this country and the adjoining cotton areas of Mexico, where it has been a destructive pest of cotton for a number of years. The flight of the pink bollworm moth and other methods of dissemination are being studied on account of their important bearing on the question of protecting American cotton against invasion. Thus far it has been kept out of our main cotton belt, but its presence in extreme west Texas and Mexico is a constant menace, and in order to be prepared to combat the pest should it become established in the Cotton Belt, investigations of all phases of the life history of the pest are being conducted in the Big Bend district of Texas, with special attention to hibernation and the effect of different types of plowing and irrigation on the insect. Methods of treating or disposing of cotton gin and mill wastes are being tested with the object of developing a practical method of procedure which will eliminate great danger of spread from this source.

(h) INSECTS AFFECTING MAN AND ANIMALS

Appropriation, 1930:	
Facial	$83,900
Balance available for eye-gnat investigations provided by Second Deficiency Act, 1929	10,000
Total available, 1930	83,900
Budget, 1931	115,000
Increase	21,100

The increase of $21,100 is submitted for the following purposes:

(1) $16,000 for initiating investigations of sand flies. These flies are so abundant and annoying especially along the coast from North Carolina to Alabama as to interfere with the agricultural development of the infested areas. Land values are depressed, livestock seriously affected and some localities are made practically uninhabitable. The demand for information on methods of control has been insistant for several years but can not be met because of the complete lack of information on the breeding places of this insect, its habits and natural enemies.

(2) $5,000 for investigation ticks and their control including a study of their parasites. The occurence of heavy losses from anaplasmosis of cattle not only makes it imperative to determine the relation of ticks to this disease, but renders necessary a more complete knowledge of the different ticks which attack man and livestock. Certain parasites of ticks are being employed against the Rocky Mountain spotted fever tick by the Montana Board of Entomology with encouraging results, and the cooperation of the Department has been requested in making possible the importation of other tick parasites and the determination of their utility.

Project Statement

Project	Expended, 1929	Estimated, 1930	Estimated, 1931	Increase
Insects affecting man.....	$15,733	$23,820	$23,820	- -
Insects affecting cattle.....	43,863	44,020	49,020	$ 5,000 (2)
Insects affecting poultry and birds.....	987	1,000	1,000	- -
Insects affecting sheep and goats.....	24,208	24,860	24,860	- -
Insects affecting miscellaneous animals.....	197	200	200	- -
Sand fly investigations.....	- -	- -	16,100	16,100 (1)
Total.....	84,988	93,900	115,000	21,100

Activities under this Appropriation

General

The funds appropriated under this heading are used for the investigation of insects which attack man and animals, and thus produce direct injury, annoyance, or carry disease.

Insects affecting man: This project is concerned with the investigation of such insects as the housefly, mosquitoes, the human body louse, the eye-gnat, chiggers, and fleas. Some of these species actually carry the germs of disease to healthy persons, while others are so intensely annoying as to cause great discomfort and suffering. The effect of malarial mosquitoes on agriculture and methods of meeting this problem under plantation conditions are being studied in Louisiana. The eye-gnat is receiving intensive study in California, where the problem has become very acute. Little is known of these small flies; hence, for the present, attention is being given to the determination of their habits, the relation of cultivation and irrigation to the breeding of the gnats, and methods of reducing their abundance by the use of trapping and sprays.

BUREAU OF ENTOMOLOGY (Continued)

Insects affecting cattle: The work under this project consists of research on the biology and control of such pests as the cattle grub, screw worm, stable fly, and lice. The cattle grub has received major attention during the past year. A thorough investigation of the factors which may be responsible for the absence of this pest from the Valley of the Red River of the North is being made to determine if some of these factors may be used in the control of the insect elsewhere in the country. The habits of the insects and the relation of climatic conditions to them are being studied, and investigations of insecticides and other control agencies which may serve as a basis for extensive control or eradication operations are under way.

Insects affecting poultry and birds: Under this project investigations are being carried on with reference to such poultry pests as lice, mites and fowl ticks. The new and widely used louse remedy, nicotine sulphate, is being thoroughly tested for the purpose of determining its practical value and its limitations. Owing to the small amount alloted to this project, the work is necessarily incidental to that of other projects.

Insects affecting sheep and goats: Under this project are being conducted in cooperation with the Texas Experiment Station and other agencies investigations of the screw worm, wool maggot, goat louse, sheep scab, and other pests, all of which constitute a serious handicap to sheep and goat raising. An intensive investigation is being made of the trapping of screw worm and other blow flies under range conditions and of parasites and other insect enemies of these pests. In some districts, where the recommendations of the Bureau have been adopted, substantial reductions in the losses sustained from screw worms have resulted, but losses are still very heavy, and additional and more effective control methods are being sought. The rapidly increasing importance of the Angora goat industry has directed attention to the heavy losses in mohair production and to the growth and health of the goats caused by lice. Investigations in this field have yielded information of great practical value to the industry.

Insects affecting miscellaneous animals: The activities under this project consist mainly of gathering specimens and data regarding abundance and loss due to insects and related parasites which attack various forms of bird and animal life, and which are detrimental to useful birds or game animals or which at times attack domestic animals or poultry. At the urgent request of Alaskan authorities, a preliminary survey of the reindeer grub problem was undertaken this year in cooperation with the Territory of Alaska.

BUREAU OF ENTOMOLOGY (Continued)

(i) STORED PRODUCT INSECTS

Appropriation, 1930	$71,900
Budget, 1931	87,000
Increase	15,100

The increase of $15,100 is submitted for the following purpose:

(1) Investigating the control of clothes moths and other insects which are injurious to stored household goods, including upholstered furniture. Enormous losses are suffered from this source every year and under present methods some of this is unavoidable since such materials as upholstered furniture and other articles may be infested before they reach the purchaser. Infestation is not easy to detect in the early stages and this condition is generally not observed until damage is almost complete. For this reason it is necessary to develop methods for preventing infestation of the product while it is being held in storage or show rooms.

Project Statement

Project	Expended 1929	Estimated 1930	Estimated 1931	Increase
Bean weevil investigations	$10,147	$10,272	$10,272	
Stored grain insects.....	20,978	37,993	37,993	
Dried fruit insects.....	13,963	15,333	15,333	
Household insects	4,160	4,162	19,262	$15,100(1)
Cold storage experiments.....	2,765	2,765	2,765	
Fumigation experiments.....	1,351	1,375	1,375	
Total.....	53,364	71,900	87,000	15,100

Activities under this Appropriation

General

The activities under this appropriation deal with the prevention of losses caused by insect pests to stored agricultural products, both raw and manufactured, and include also the investigation of household pests.

Bean weevil investigations: The work under this project consists of an investigation of the common weevils destructive to beans and cowpeas. These major pests of dried beans and cowpeas begin their attack while crops are maturing in the field, but continue their work of destruction in the seeds in storage. The work during the past few years has been centered in the California bean growing regions and excellent cooperation has been established between county, state and private

organizations. The latest phase of the cooperative work consists in an intensive campaign based on a minute examination of farmers' bean consignments delivered at warehouses to determine to what extent the wholehearted application of clean culture and suppression in storage will produce crops free from infestation.

Stored grain insect investigations: This investigation consists of a study of insects affecting grain and grain products, such as flour, meals, breakfast foods, etc., and the suppression of insects in the establishments in which they are stored or manufactured. This work has resulted in a great increase of excellent storage bins constructed on southern farms where corn must be protected from weevils if held over winter. A gread advance in methods of insect control, applicable to county and terminal storage grain elevators, and in lessening grain conditions of railway cars, docks and ships transporting, storing and exporting American flour and grain products is being greatly improved.

Dried fruit insect investigations: The investigation of dried fruit insects is conducted in California for the most part. To date the work is centered in an attempt to lessen the insect losses sustained by fig growers. Very positive advances have been made along the line of orchard and warehouse sanitation, where proper storage houses or fumigable storage bins have been devised and installed. New methods of applying fumigants in this specialized industry are being investigated. Effective cooperation with the industry is being maintained, especially with the Dried Fruit Association of California.

Household insect investigations: This project deals with the investigation of practical methods for controlling household pests, such as clothes moths, carpet beetles, bedbugs, cockroaches, etc. The insect problems confronting the industry concerned with the household goods have multiplied with its rapid growth during the past few years and now presents insect problems which cannot be solved with the control methods now available. A promising start has been made toward a study of moth-proofing solutions.

Cold storage experiments: This investigation has for its object the determination of how long and at what temperatures various types of food and other commodities must be held in cold storage before all insect life is destroyed.

Fumigation experiments: The investigation of fumigants, both with and without the cooperation of the Bureau of Chemistry and Soils, involves a preliminary study of all chemicals that give promise to be useful as fumigants of food and other commodities. Several years ago carbon disulphid and hydrocyanic acid gas were the only effective fumigants available for use in most establishments and on the farm. The fire and explosion hazards of carbon disulphid and the toxic and poisonous nature of hydrocyanic acid gas have prohibited their use in very many cases and have left many establishments without an effective insect control. These investigations have already shown that several new gases used both alone and in combination have promise. These are now being investigated to determine their field of usefulness.

BUREAU OF ENTOMOLOGY (Continued)

(j) TAXONOMY & INTERRELATIONS OF INSECTS

Appropriation, 1930	$145,000
Budget, 1931	171,000
Increase	$ 26,000

The increase of $26,000 is submitted for the following purposes:

(1) $6,000 for the identification of mosquitoes and other blood sucking flies. The amount indicated is urgently needed to continue the work which the Bureau is required to perform in the classification of mosquitoes and related insects. The Bureau now has no one on whom it can call regularly for this work which is much in demand for various Federal, State, District, and various agencies. These groups look to the Bureau to supply information as to the identification of these insects as this information serves as a basis for the application of control or extermination programs.

(2) $4,000 for the identification of plant bugs. The Bureau at the present time receives many requests for identification of many economic species of true plant bugs including both beneficial and injurious forms. Just now it is able to meet this demand in part through the unpaid collaborative services of a scientist employed by another Bureau of the Department. While this arrangement has been very helpful as an emergency measure it has not enabled the Bureau to meet the requests made upon it.

(3) $1,260 to employ clerical assistance for handling the increased correspondence and note records resulting from the growth of the Insect Pest Survey and the expansion of the Survey's activities to cover world distribution of insect pests. The added personnel will take care of additional correspondence work incident to the establishment in several of the States of State Insect Pest Surveys. Upon establishment of these local surveys, the States using their own personnel are organizing on an efficient basis to report to the Federal Insect Pest Survey current insect conditions thus enormously increasing the value of the records of the Federal Survey and at the same time adding only a little to the expense of the latter.

(4) $14,740 for initiating work in carrying information on pest control to farmers, fruit growers and livestock producers. Large losses from insect injury are suffered annually, a considerable portion of which could be prevented by the adoption of control measures which have been developed by entomologists but which are not in practice because the information on their application has not reached the growers. Under this activity well trained men will work in cooperation with Federal and State extension agencies to put on campaigns and demonstrations which will bring to the farmers the latest developments in insect control.

BUREAU OF ENTOMOLOGY (Continued)

Project Statement

Project	Expended 1929	Estimated 1930	Estimated 1931	Increase
Taxonomic Investigations on Beetles....	$22,897	$ 28,070	$28,070	- - -
Taxonomic Investigations on Moths.....	18,200	18,220	18,220	- - -
Taxonomic Investigations on Flies.....	4,780	4,820	10,820	$6,000 (1)
Taxonomic Investigations on Hymenoptera (parasites, wasps, etc.)	29,072	30,077	30,077	- - -
Taxonomic Investigations on Grasshoppers	5,395	5,440	5,440	- - -
Taxonomic Investigations on True Bugs	- - -	- - -	4,000	4,000 (2)
Taxonomic Investigations on Ectoparasites and mites.....	5,209	5,210	5,210	- - -
Taxonomic Investigations on Scale Insects	10,954	10,960	10,960	- - -
Bioclimatic Studies of Insects.....	8,011	8,080	8,080	- - -
Morphological Investigations	9,798	9,800	9,800	- - -
Exchange of Useful Insects	10,550	10,580	10,580	- - -
Insect Pest Survey	12,826	13,743	15,003	1,260 (3)
Public Relations	- - -	- - -	14,740	14,740 (4)
Total	137,692	145,000	171,000	26,000

Activities under this Appropriation

General

The work of this division deals chiefly with the important fundamental problems of insect identify, distribution and behavior; of the general interrelations among insects and between insects and the environmental conditions surrounding them. It also involves the maintenance of a survey unit which reports from month to month the existence and progress of outbreaks of injurious character, as it involves the supplying of technical information on the identity and habits of insects to investigators of entomological problems throughout the Federal service and in state organizations, universities, and colleges in this country, to similar investigators throughout the world, and to numerous quarantine officials. Continuous studies on insect classification are necessary to meet the demands made on the division, and there should be a considerable increase in the staff of specialists now employed in order adequately to meet the requests for assistance which now flood it.

Taxonomic investigations on beetles: The work under this project consists in studies on the classification and identification of both adult and immature stages of injurious and useful beetles, such as the leaf beetles, may beetles, wood boring beetles, weevils, and many others. Recently it has been possible to supplement the work of the regular staff assigned to this project by the temporary employment of specialists of high standing to work on certain bark beetles and on the relatives of the Japanese beetle.

Taxonomic investigations on moths: The work under this project consists in studies on the classification and identification of both adult and immature stages of injurious moths, such as leaf miners, twig borers, etc. Work on this project will be much improved by the addition of an entomologist to study the cutworms and related moths.

BUREAU OF ENTOMOLOGY (Continued)

Taxonomic investigations on flies: The work carried on under this project at present consists in studies on the classification and identification of adult and immature stages of injurious and beneficial flies, such as fruit flies, parasitic and predacious flies and others. The services of an expert on this project to study mosquitoes are much needed because of the demands for identifications of these insects from public health officials and organizations.

Taxonomic investigations on Hymenoptera (Parasites, wasps, etc.): The work under this project at the present time consists in studies on the classification and identification of parasitic and predacious wasps, many of which are of very great importance in the biological control of injurious insects.

Taxonomic investigations on grasshoppers: The work under this project consists in studies on the classification and identification of injurious grasshoppers, crickets, earwigs, and related insects.

Taxonomic investigations on ectoparasites and mites: The work under this project consists in studies on the classification and identification of mites and of insects belonging to several economic groups, including the fleas, biting and sucking lice, etc.

Taxonomic investigations on scale insects: The work under this project consists in studies on the classification and identification of scale insects which are of particular economic importance both because of the great damage which they do to plants and because of the ease with which they are transported on their hosts, thus creating a serious quarantine problem.

Bioclimatic studies of insects: The work carried on under this project consists in a very broad investigation of the relation of a wide variety of environmental factors, such as climate, for example, to the occurrence and abundance of insect pests. It involves a correlation of biological data obtained from many sources and application of conclusions derived from these data to various insect problems.

Morphological investigations: The work carried on under this project includes two well defined activities. The first is comparative study of the parts making up the insect body as these are modified in the different groups of insects. The second consists of research on the bacterial diseases affecting insects. Marked progress has been made in the preparation and publication of papers on these subjects which serve as authoritative sources of information for all entomologists engaged on technical investigations relating to either of the subjects shown above.

Exchange of useful insects: The work under this project consists in

research workers. Reports of serious outbreaks of insect pests are disseminated to the entomologists most concerned and the data assembled is analyzed to secure further light on the principles affecting the distribution and seasonal abundance of both native and introduced insect pests.

(k) BEE CULTURE

Appropriation, 1930	$54,400
Budget, 1931	75,000
Increase	20,600

The increase of $20,600 is submitted for the following purposes:

(1) $15,000 to conduct apiary investigations in the Pacific Coast States in order to reduce the unnecessary losses suffered by bee keepers because of the lack of satisfactory methods of handling bees which are in keeping with the extremes of topographical and climatic conditions. The problem is also complicated by the wide variation of honey plant sources such as is found in the Pacific Coast States. Due to this difficulty whole crops of honey are frequently lost and much available nectar is left ungathered.

(2) $5,600 for broadening the scope of Regional beekeeping studies to include practical methods of removing honey from the hive, its care in the honey house and its preparation for market in order to insure the retention of qualities required by foreign and domestic markets and which at the same time are in line with sound apiary practice. Large quantities of honey are lost annually through fermentation, excessive heating or underheating, and premature granulation. The proper apiary methods for avoiding these conditions are not understood and there is no method available at present for avoiding the losses now suffered by the industry. The work on this item is closely correlated with the investigations on honey conducted by the Bureau of Chemistry and Soils.

Change in Language

The language of this item has been amended by adding after the words "bee culture" the words "and apiary management." This change is made in order to more accurately describe the work under this appropriation.

Project Statement

Project	Expended 1929	Estimated 1930	Estimated 1931	Increase
Behavior of bees.....	$13,971	$14,020	$14,020	- - -
Diseases of bees.....	6,409	6,300	6,300	- - -
Physiology of bees.....	4,746	5,050	5,050	- - -
Regional beekeeping methods.....	4,267	4,310	9,910	$5,600(2)
Demonstrations in beekeeping.....	3,875	3,940	3,940	- - -
Intermountain beekeeping.....	10,178	10,340	10,340	- - -
Beekeeping in Southern States.....	10,057	10,440	10,440	- - -
Beekeeping in Pacific States.....	- - -	- - -	15,000	15,000(1)
Total	53,503	54,400	75,000	20,000

BUREAU OF ENTOMOLOGY (Continued)

Activities under this Appropriation

General

The work under the appropriation "Bee Culture and Apiary Management" is concerned with investigations to make the production of honey more profitable to the beekeeper and with research of the use of bees for pollination purposes.

Behavior of bees: The work under this project includes investigation of the behavior of the bee under natural and artificial conditions. The knowledge gained is directly applicable to the improvement of existing beekeeping methods. The efforts of various weather factors upon flight activity, upon the behavior of bees in gathering nectar and upon temperature conditions within the hive are being studied. A comparative study of various races and strains is under way to render more clear their biological and physical differences. Preliminary breeding experiments with the end in view of securing better strains have been undertaken. An investigation of the effect of ultra-violet rays on the productivity of honey bees is in progress.

Diseases of bees: The object of this project is to determine the causes, methods of spread, and methods of treating diseases of bees under apiary conditions. Besides research on the foregoing lines the work includes a diagnosis of samples sent in from all over the country and of the examination of all shipments of imported queenbees, except from Canada, as required by Act of Congress.

Physiology of bees: The object of this project is to determine the inner organic responses of the individual bee to different foods, temperatures, and other factors. The knowledge gained will be of service in providing proper conditions for the bee as an individual, the proper food for winter being one practical application. This project also deals with the various physiological processes which occur within the bee during the transformation of nectar into honey, as well as with other factors which influence this transformation.

Regional beekeeping methods: The object of this project is to study those special problems of apiary management in regions other than those served by the Intermountain Bee Culture Field Station and the Southern States Bee Culture Field Station, as well as to develop methods applicable to the country as a whole. Phenological data having to do with the principal honey plants throughout the country are being collected. A collection of honeys from all over the country is being maintained.

Demonstration in beekeeping: The object of this project is to furnish beekeepers with reliable advice on all beekeeping questions. At the present time this is being done largely by correspondence, and by sending bulletins

and pictures. Movie films dealing with various phases of beekeeping are also prepared from time to time. Actual demonstrations at beekeepers' meetings are necessarily much restricted at present.

Intermountain beekeeping: The object of this project is to determine the proper methods of honey production in the intermountain region. Studies on the flight range of honey bees, on wintering conditions, and on the spread of American foulbrood are in progress with headquarters at Laramie, Wyoming.

Beekeeping in Southern States: The object of this project is to study the various phases of honey production, package bee production, and queen rearing under Southern conditions. An investigation of the various shipping containers for package bees is now under way, with the object of standardizing these packages. A survey of the floral resources of the South, which will include not only listing the nectar-secreting and pollen-yielding plants but also their blooming dates and geographic distribution, is under way. Headquarters for these investigations are located at Baton Rouge, Louisiana.

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Note.- See also Miscellaneous Section for proposed allotment under "Special Leaf Hopper Research."

BUREAU OF BIOLOGICAL SURVEY

(a) GENERAL ADMINISTRATIVE EXPENSES

Appropriation, 1930	$73,280
Budget, 1931	77,520
Increase	4,240

The increase of $4,240 is needed for the following purposes:

(1) $1,440 for a clerk-typist in the office of the editor. At present it is necessary for most of the clerical and typing work of this office to be performed by a qualified editorial clerk, whose full-time services in the position for which qualified are urgently needed to keep up with the expanding work of the Bureau, which is registered in the increasing volume of reports and other manuscripts for official and outside publication, statements that must be prepared for technical periodicals, the public press, the radio, etc.

(2) $1,800 for an auditor and bookkeeper in the office of accounts. There has been no increase in personnel in the office of accounts for a number of years to keep pace with the continually increasing appropriations and resulting work. This work has increased nearly 40 per cent during the past eight years with the same personnel to handle it. The point has now been reached where this force is unable to keep abreast of the work. During the months of July and August the equivalent of 26 days overtime work was performed by the personnel of this office.

(3) $1,000 for traveling and general administrative expenses of the Bureau. The expanding work of the Bureau is making larger demands upon its administrative funds to meet necessary expenses. The increase is needed partly for traveling expenses, for replacing office equipment, including adding machines.

Project Statement

Project	Expended 1929	Estimated 1930	Estimated 1931	Increase
General administration.....	$72,934	$73,280	$77,520	$4,240 (1-2-3)

Activities under this Appropriation

This appropriation provides for the payment of salaries and traveling expenses of the general administrative force of the Bureau and of the various units thereunder located in the city of Washington, including the offices of the editor; exhibits, photographs, and publication distribution; accounts;

mails and files; and property; for the purchase of supplies and equipment; and for maintenance expenses of these various offices.

(b) MAINTENANCE OF MAMMAL AND BIRD RESERVATIONS

Appropriation, 1930	$75,000
Budget, 1931.	80,000
Increase.	5,000

There is an increase of $5,000 in this item. This involves one decrease of $5,200 and seven increases totaling $10,200, as follows:

(1) $5,200 decrease due to dropping of nonrecurring item provided in 1929 and 1930 for interior fencing operations on the National Bison Range. This amount has been allotted for expenditures for this purpose during the fiscal year 1930.

(2) $1,620 increase for a stenographer in the Washington office needed to provide a force adequate for handling the general administration of the bird and mammal reservations. This work has been increasing over a period of years, and has now reached the point that an additional clerk is of the utmost importance.

(3) $3,300 increase for more adequate policing and supervision of 20 reservations (mostly for birds) located in the southeastern United States in a region used as a wintering ground for waterfowl and a nesting ground for important plume-bearing birds and other species of economic importance and of general interest. These reservations should be given the protection their importance demands, and this can be done only through this increase in the appropriation.

(4) $800 increase for posting reservations. There are a number of bird refuges that have never been posted and others need reposting. This work should be done to warn the public against molesting the birds on the protected areas.

(5) $700 increase for the purchase of 18.66 acres of land adjoining the main entrance to the National Bison Range. This is where the headquarters buildings of the reservation are situated, and is on a main highway and near the railroad station of Moiese. Unless purchased so as to protect it from outside encroachment by private interests it is likely to be used for purposes considered undesirable and detrimental to the interests of the preserve. The price for which it can be obtained at the present time makes its purchase most desirable.

New Language

New language has been added at the end of the paragraph for "Maintenance of Mammal and Bird Reservations," as follows: "and not to exceed $700 additional for the purchase of land, including improvements thereon, adjoining the National Bison Range."

BUREAU OF BIOLOGICAL SURVEY (Continued)

(6) $1,000 increase for barn on Elk Refuge, Wyoming. This barn is greatly needed to provide proper housing for the livestock and feed for them. They are now kept in an unsatisfactory old log stable which affords no facilities for the storage of feed.

(7) $2,380 increase for corrals and slaughter sheds on Niobrara Reservation, Nebraska. Due to the natural increase from year to year in the number of animals on this reservation, a surplus is rapidly developing, and capturing corrals and slaughter sheds are needed in the north pasture for the capture and disposal of the surplus animals. The herd will have reached the carrying capacity of the range by the fiscal year 1931.

(8) $400 increase for fire-prevention work at the Bison Range, Sullys Hill Game Preserve, and Niobrara, all of which reservations are subjected to fire hazards and should be protected.

Project Statement

Project	Expended 1929	Estimated 1930	Estimated 1931	Increase or Decrease
Bird refuges	$ 8,485	$14,023	$19,743	+$5,720 (2-3-4)
National Bison Range (Mont.)	19,223	19,349	15,049	- 4,300 (1-5-8)
Wind Cave Game Preserve (S. Dak.)	45,265*	9,437	9,437	--
Elk Refuge (Wyo.)	20,872	19,472	20,472	+ 1,000 (6)
Sullys Hill Game Preserve (N.Dak.)	5,151	5,486	5,586	+ 100 (8)
Niobrara Reservation (Nebr.)	5,372	6,233	8,713	+ 2,480 (7-8)
Restocking reservations	409	1,000	1,000	--
Total	104,777*	75,000	80,000	+ 5,000

* $5,210 transferred from other subappropriations.

Activities under this Appropriation

General

There are 81 reservations for the protection of birds and mammals to be administered under this appropriation in the United States, Alaska, Hawaii, and Porto Rico. Four are big-game preserves (National Bison Range, Mont.; Wind Cave Game Preserve, S. Dak.; Niobrara Reservation, Nebr.; and Sullys Hill Game Preserve, N. Dak.) with large game pastures inclosed by high strong fences and maintained to perpetuate buffalo, antelope, elk, mountain sheep, and deer, as well as less important animals under almost natural

conditions where they may be studied and enjoyed by the public. One, the Elk Refuge in Wyoming, is maintained for the feeding of the thousands of elk which each winter are forced from the mountains into the valley because of deep snows and scarcity of food, and also for raising hay for the animals. On each of the four big-game preserves, and at the Elk Refuge, an officer is in charge who assists the public to view, study, and enjoy the animals on the preserve; maintains fences and buildings; and operates the preserve as a fair-sized ranch. The surplus animals produced in the herds of big game are disposed of to zoos, parks, and other institutions and individuals.

Two reservations located along the line of the Alaska Railway are of special interest to the public: one (the Alaska Railroad Beaver and Muskrat Preserve) was set aside primarily for the colonies of beaver and muskrat; the other, the Curry Game, Fish, and Bird Preserve, is a wild-life resort. A third, Nunivak Island, off Alaska, is important mainly for reindeer, caribou, foxes, and ptarmigans.

Seventy-three reservations were primarily established for the protection of birds. Two of these (Malheur, Oreg., and Big Lake, Ark.) are especially valuable for migratory waterfowl, and 26 others in 13 States are primarily valuable for waterfowl. The remaining 45 are situated along the sea coasts or are islands in fresh water lakes or rivers in 14 States and Territories and are mainly valuable as nesting grounds for gulls, terns, pelicans, herons, and other sea birds. Nearly all of the reservations, however, are of some value as refuges for mammals as well as birds, and some are of value to fish and other aquatic life. Protection of these reservations, exclusive of Lake Malheur and Big Lake Bird Reservations, is undertaken during the periods they are frequented by birds or mammals, and to the extent the funds permit, by allotment to the regular game protectors of travel funds to enable them to police the areas or by the appointment of part-time officers to patrol the tracts and thus prevent molestations of their wild life.

Malheur Reservation, Oreg., and Big Lake Bird Reservation, Ark.: Protectors are maintained to patrol the nesting, feeding, and resting grounds with small boats to prevent molestation of the birds, which at times congregate on these refuges in great numbers. There are various kinds of ducks and geese, and some shorebirds and plume-bearing herons, as well as other less important birds.

National Bison Range, Mont.: During the fall of 1929 this preserve had 365 buffalo; 69 elk; 100 mountain sheep, and 170 deer in an inclosure of 18,521 acres. A stream flowing through this refuge is also used by great numbers of

mallard ducks, which, as shown by bird banding, are mainly en route to or from Idaho, Washington, Oregon, California, Nevada, Wyoming, or Utah, or to a lesser degree, the Plains States east of the Rocky Mountains. The protector's quarters and other buildings are located in the inclosure which is surrounded by about 23 miles of boundary fence. In addition, 11 miles of interior fencing have been completed, or are under construction, within the inclosure.

Wind Cave Game Preserve, S. Dak.: During the fall of 1929 this preserve supported 174 buffalo, 98 elk, 25 antelope, and a few deer. It consists of two pastures of about 3,000 acres, each situated mainly on the Wind Cave National Park. The pastures are on opposite sides of the highway, and the majority of the visitors to the national park have an opportunity of seeing from the road one or more kinds of the game animals held in the pastures. About 17 miles of big-game fence inclose the pastures. Protector's quarters and other buildings are maintained as a part of this preserve.

The Elk Refuge, Wyo.: The principal activity during the summer time is the preparation and irrigation of hay lands and the harvesting of the crop on a tract of 4,520 acres. In winter the feeding of the hay to a herd of elk varying from 1,500 to 7,000 from about the middle of January to the end of March is the principal employment of the protector and his assistants. Quarters for employees and various farm buildings are maintained on the refuge; also more than 25 miles of stock fence inclosing the various tracts comprising the refuge has to be maintained.

Sullys Hill Game Preserve, N. Dak.: During the fall of 1929 there were 13 buffalo, 31 elk, 17 antelope, and 3 deer on this 780-acre preserve, which is situated entirely on the Sullys Hill National Park and is inclosed by 4.5 miles of big-game fence. This preserve is a veritable oasis in the Plains Region and is frequented as a recreational area by great numbers of people from the surrounding country and even from a distance. Protector's quarters, barn, and various structures for the use and convenience of the visiting public are maintained.

Niobrara Reservation, Nebr.: During the fall of 1929 there were 106 buffalo, 115 elk, and 9 antelope in the 4,433-acre pasture of this preserve. A total of 14 miles of big-game fence incloses one pasture of 4,000 acres and two small areas totaling about 433 acres. In addition, 15 miles of stock fence inclosed the south portion of the reservation. This is an important refuge for prairie chickens and other birds of the region, and is the resort of a small flock of wild turkeys. The buildings on this reservation were erected by the War Department when it was Fort Niobrara, prior to its abandonment in 1911 as a military reservation.

Restocking: The restocking work consists of transferring valuable game mammals and birds from reservations that have a surplus to reservations that have none, or obtaining them from other available points and placing them on reservations administered by the Department, with a view to the establishment of colonies there.

BUREAU OF BIOLOGICAL SURVEY (Continued)

(c) FOOD HABITS OF BIRDS AND ANIMALS

Appropriation, 1930	$633,273
Budget, 1931	680,000
Increase	46,727

An increase of $46,727 is submitted for the following purposes:

(1) $7,000 for two junior biologists and for equipment and traveling expenses in connection with the study of problems of economic ornithology. The bureau is constantly requested to assist in cooperative investigational work or to make special studies of problems in economic ornithology, but is prevented from doing so by shortage of properly trained men. Characteristic requests of this nature are the invitation by several States to assist them in a cooperative study of the introduced pheasant in relation to agriculture, investigation of the food habits of birds and animals classed as vermin and repeated requests for assistance by the committees organized for the study of the factors controlling the abundance of the ruffed grouse and other game birds. The Bureau responds to such demands to the best of its ability but can meet only a small proportion of the demands upon it with its present force. It is planned to place one man in the eastern United States and the other in the Western States.

(2) $29,597 for the control of injurious rodents. This is needed largely for the control of injurious rodents on national forests. More than 8,000,000 acres are infested with rodents, where the carrying capacity for stock grazing is being reduced at least 25 per cent because of their depredations. This increase will enable the Department to handle some of the worst infested areas, and will result in making the grazing lands treated a greater asset to the Government. Part of the increase is also needed for enlarging rodent-control work now being carried on in certain States and provide necessary personnel in Washington and the field service.

(3) $10,130 for the control of predatory animals. This will enable the Bureau to take up cooperative work with the States of Wisconsin and Minnesota for the control of predatory animals. Each of these States has provided $15,000 for this purpose. It will also allow the employment of additional personnel needed to carry out the objects of this project.

Project Statement

Project	Expended 1929	Estimated 1930	Estimated 1931	Increase
Investigations of relation of native and introduced birds and other animals to agriculture	$ 32,998	$ 59,000	$ 66,000	$ 7,000 (1)
Investigations of injurious animals	21,613	6,150	6,150	--
Control methods research	31,557	34,300	34,300	--
Control of injurious rodents	209,457	206,845	236,442	29,597 (2)
Control of predatory animals.....	318,225	326,978	337,108	10,130 (3)
Total	613,850	633,273	680,000	46,727

BUREAU OF BIOLOGICAL SURVEY (Continued)

Activities under this Appropriation

General

Activities under this appropriation are classed as investigational and service to the public. Investigations are conducted to determine practical methods for the control of injurious rodents and predatory animals and scientific studies are made of the economic status of North American birds and other animals. Control operations are carried on in regions where warranted by damage by injurious rodents and predatory animals to agriculture, forestry, livestock, and game, and occasionally steps are taken to control such birds as become destructive to crops or a nuisance otherwise locally.

The bulk of the appropriation is spent in serving the public through the development of practical methods for the control of injurious rodents and predatory animals and demonstrating these methods to farmers, stockmen, orchardists, and others interested, and conducting extensive cooperative control campaigns.

Investigation of native and introduced birds to agriculture: Studies under this project are concerned chiefly with the economic status of North American birds and other animals. The main lines of investigation, with some collateral studies into which they have led, are discussed in the following paragraphs:

Food habits of birds: The relation of birds to agriculture, horticulture, and forestry depends principally upon their food habits. Since its establishment, the Biological Survey has been carrying on studies of the food habits of birds by groups, both in the laboratory and in the field, but in late years the work has turned more to special investigations in certain areas or to the relations of birds to specific crops or other sources of their subsistence. Illustrations are cited of investigations of the relation of rice birds to the rice crop in Louisiana, of insectivorous birds in relation to the celery leaf-tyer in Florida, of birds in relation to the mountain pine beetle in Montana, and of the activities of fruit- and bud-eating birds in California. The work under this project has resulted in the publication of comprehensive information on the food habits of more than 200 species of native birds and briefer accounts of about 500 species. Data obtained by project investigators or available from other sources are on file, so that some information on the food of practically all of our native birds can be furnished promptly. The information that has been accumulated in these investigations underlies the whole system of protective laws and regulations of the Federal and State government, which together make up the best code of bird protective measures in the world.

Food habits of other animals: Investigations of the food of other animals have not been carried on in so comprehensive a way as have those of birds, but they are so similar in nature and require so much the same material equipment and training of investigators that for some time they have been given incidental attention. In recent years special problems relating to the food of mammals have been the subject of research, such as the food habits of the grasshopper mice of the western States, the nature of the food of the starving

deer of the Daibab National Forest of Utah, and the character of the food of seals and sea lions on the Northwest Coast. A comprehensive report on the food habits of toads has been prepared, from which it is obvious that toads may have as great individual value during their active season as some of our insectivorous birds. An investigation of the food of the alligator has been completed with special reference to its relation to the muskrat industry in Louisiana. The collection of data on the food of snakes is much needed to correct popular erroneous impressions as to the utility of these reptiles.

Methods of control of injurious birds: The problem of bird control is one that must be studied by economic ornithologists, both for the reason that special methods must usually be adopted, the elaboration of which can best be accomplished by someone who thoroughly understands the habits of the birds, and further because public opinion relating to bird control is on an altogether different basis from that relating to the control of mammals. In fact, popular opposition to bird control is almost always encountered, and the work must be done in a careful and tactful manner. Recent developments in this field are the discovery that "bird minding" in rice fields can be carried on to greater advantage and more economically by the use of small caliber rifles from central shooting towers than by the former methods, and that the treatment of roosts of English sparrows and sometimes of starlings and other birds by gases from sodium-cyanide flakes applied with a blower is feasible.

Attracting birds: A special phase of the subject of attracting birds is that of improving food resources for waterfowl. The fundamental data upon which recommendations along this line are made were obtained through the food habit studies previously mentioned. The resulting information with recommendations based upon it, together with information on sources of planting material, have been made available in publications that have been widely distributed. These recommendations have been widely used, and the result, in addition to greatly improved conditions for wild fowl, has been the building of a new business of dealing in wild duck food plants that has attained considerable proportions. The attraction of waterfowl is essentially a matter of improvement of environment, especially as it relates to food supply. Similar work is being carried on with regard to upland game birds, to insure the maximum abundance of these desirable species. The object of studies for the benefit of the small-bird population in general is improvement of environment not only in the way of food supply but by the addition of devices for winter feeding and for improving water supply and nesting sites. This is a popular part of the work under this project, since it appeals to all classes of bird lovers, numerically a very important part of the population.

Control methods research: Investigations are made to determine practical methods for the control of injurious rodents and predatory animals, both at the Bureau's biochemical laboratory at Denver, Colo., and at various points in the field where actual control operations are under way. In the laboratory studies are made of physical and chemical properties of various poisons in order to ascertain their fitness for use in the control operations. Pharmacological studies are also made to determine the lethal dose, the manner and rate of absorption, the rate of elimination, and in general the effect of various poisons on different species of animals. The laboratory also processes and prepares special poisons in quantity for use by the Bureau and its cooperators in control operations.

BUREAU OF BIOLOGICAL SURVEY (Continued)

The territory in which field operations are conducted is divided into five districts, each with an investigator who makes careful observations of the acceptability of the different poisons by the various animals, and studies of their efficiency under natural conditions. In these trials the investigators make detailed observations of the habits of the animals.

Control of injurious rodents: Operations are conducted to control such injurious rodents as ground squirrels, prairie dogs, jack rabbits, pocket gophers, woodchucks, mice, and rats, which cause losses to farm crops and range forage in the United States amounting to hundreds of millions of dollars annually. Their denudation of lands through close cropping of native grasses is one of the primary causes of destructive erosion.

Organized rodent control campaigns are carried on under the leadership of the Biological Survey, both in the Western States and in the Eastern. These campaigns are conducted in cooperation with States, counties, local organizations, and individuals.

The task of control involves the entire United States and its execution requires not only action by Federal and State governments but the voluntary cooperation of hundreds of thousands of farmers and others whose active interest in the control campaign must be enlisted. Tens of thousands of farmers are availing themselves of the opportunity to obtain relief through cooperative action under trained leadership and applied methods of control developed by the Bureau.

The cooperative funds contributed to this work from these sources and expended under the direction of the Bureau are about four times the amount of available Federal funds.

Control of predatory animals: Operations for the control of such predatory animals as coyotes, wolves, bobcats, and mountain lions, which make serious inroads on sheep, cattle, pigs, poultry, and wild game are conducted in all of the States from Montana to Texas and westward, and also in South Dakota, Oklahoma, and Arkansas. Work under this project is organized by the division of the United States into districts, each district consisting of one or more States. A district leader maintains headquarters in each district, directs the work, and employs hunters and trappers as required, usually from 20 to 60 hunters and trappers in each district. Cooperation is maintained with State and county officials, local organizations, and individuals.

Funds contributed from these sources are expended under the direction of the Bureau, and in most cases they greatly exceed the Federal appropriations, during the past year being about twice the amount of the Federal funds available.

During the past year 101,661 predatory animals were destroyed in this cooperative work, which resulted in an estimated saving of over $6,000,000 worth of livestock.

BUREAU OF BIOLOGICAL SURVEY (Continued)

(d) PRODUCTION OF FUR-BEARING ANIMALS

Appropriation, 1930	$51,200
Budget, 1931	64,000
Increase	12,800

The increase of $12,800 is requested for the following purposes:

(1) $2,700 for personnel in the Washington office. This will supplement funds now available and allow the employment of an associate biologist, who will be assistant head of division. The head of the division must frequently be in the field, and the demands for information regarding the production of fur animals and combating their diseases and parasites have so increased that this additional assistance is most necessary to the proper administration of the work. It will also provide for part-time service of a clerk-typist who is much needed in the office.

(2) $2,000 for additional personnel at the Fur-Animal Experiment Station, Saratoga Springs, N. Y. Too much of the time of the director of the station is now occupied with correspondence and minor clerical details, which could be handled by a clerk if one were available. The director is a specialist on diseases and parasites of fur animals and is practically alone in his field of investigation. His services are greatly in demand not only in directing the operations at the station but in answering calls from fox breeders for assistance. He should be free to devote his entire time to the more important demands upon his time, and this can be done only if he is provided with more assistance. $1,440 is required for a clerk and $560 for the employment of additional laborers.

(3) $5,000 for purchase of animals for Fur-Animal Experiment Station, Saratoga Springs, N. Y. The number and kind of fur animals at the station are entirely inadequate for the necessary research called for in the production of fur animals, and the experimental work in feeding, breeding, and handling fur animals in captivity is greatly handicapped because of this lack of stock. With the increase about 5 pairs each of silver foxes and minks can be obtained.

(4) $3,100 for laborer, for feed for rabbits, and miscellaneous expenses at the Rabbit Experimental Station, Fontana, Calif. The growth of the work at the station requires an additional laborer to handle the increased number of breeding rabbits, and additional funds for the purchase of feed for them. $1,320 is required for the laborer and $1,780 for feed and miscellaneous items.

BUREAU OF BIOLOGICAL SURVEY (Continued)

Project Statement

Project	Expended 1929	Estimated 1930	Estimated 1931	Increase	
Investigations of fur animals...	$11,349	$13,700	$16,400	$2,700	(1)
Diseases of fur animals.....	12,703	12,500	12,500	--	
Fur-Animal Experiment Station, (N. Y.).....	13,280	12,500	19,500	7,000	(2-3)
Rabbit Experiment Station, (Calif.).....	12,150	12,500	15,600	3,100	(4)
Total.....	49,482	51,200	64,000	12,800	

Activities under this Appropriation

Field operations for the benefit of fur farming are carried on at two experiment stations and, at present, in other sections in conjunction with a cooperating institution. The main purposes are to conduct investigations, experiments, and demonstrations in connection with the production and utilization of fur animals, including rabbits for both food and fur. The great importance of fur in industry and the need of maintaining the supply of raw materials have created a demand for information as to how the fur supply may not only be maintained in quantity, but improved in quality, information that can be provided only by experiments in the production of fur animals under controlled conditions, accompanied by investigations of their diseases and parasites for the purpose of determining methods of prevention and treatment. All these lines of work are undertaken at the field stations with reference to the species raised there, special work on epizootic diseases is undertaken at the University of Minnesota, and demonstrations and recommendations are made also on the ranches of individual fur farmers throughout the country.

Investigations of fur animals: Studies are made of the propagation of fur animals on fur farms, their commercial utilization, feeding methods in captivity, means of prevention and treatment of diseases and parasites, management of fur ranches, and the utilization of fur products, and recommendations are made for the guidance of fur farmers and others concerned, and on request advice is given to agencies interested in fur-farming legislation.

Diseases of fur animals: In 1927 a cooperative undertaking was entered into between the Biological Survey and the University of Minnesota, whereby there would be conducted at the Medical School, located at Minneapolis, and in the vicinity, a program of cooperative research on diseases of fur-bearing animals. Biologists of the Survey work in cooperation with

the staff of the Medical School, the purpose being to meet the requests coming from ranch owners for assistance in controlling infectious diseases of foxes and other animals on fur farms. These investigations are most complete and comprehensive and have been made possible through coordination of field and laboratory investigations.

Saratoga Springs (N. Y.) Fur-Animal Experiment Station: The station grounds are on a 20-acre tract, about three-fourths of which is excellent forest growth that makes it suitable for the fur bearers. The animals maintained at the station include, or have included, red, cross, and silver foxes, martens, minks, skunks, badgers, and others. Additional species will be experimented with as the work develops and the funds permit.

The prime object of this station is to determine the most efficient methods of producing fur bearers in captivity. The station is not operated as a farm for commercial profit through the sale of either breeding stock or pelts, but all energies are directed to developing economical methods of producing fur of fine quality, insuring sanitary surroundings for the animals, and preventing outbreaks of disease or infestation of parasites. Surplus animals are pelted, however, and the proceeds from the sale of skins are deposited in the United States Treasury. No live animals are sold for any purpose.

Through the instrumentality of this station valuable information is being developed regarding all the species of fur bearers now being propagated on fur ranches in the country. Their habits are observed here and elsewhere, and investigations are made of the best management practices regarding feeding, breeding, and housing captive animals and the prevention or control of the diseases and parasites to which they are subject when concentrated in numbers greater than are ordinarily found in small areas in the wild.

Fontana (Calif.) Rabbit Experiment Station: The prime object of the station is to determine the best methods of producing rabbits for food and fur. Closely cooperating in the solution of the problems confronting rabbit breeders are the Fontana Farms Company, National and State organizations, and scientific societies and institutions, as well as agricultural colleges, whose object is to develop rabbit raising.

The breeds of rabbits donated by rabbit breeders with which experiments are being carried on at present are White and Red New Zealand, Blue and White American, Flemish, Chinchilla, French Silver, Havana, American Sable, and Polish. Other breeds may be included as the work develops and as funds permit.

The equipment furnished by the Fontana Farms Company includes the site of a five-acre orange grove and necessary building.

BUREAU OF BIOLOGICAL SURVEY (Continued)

(e) BIOLOGICAL INVESTIGATIONS

Appropriation, 1930	$56,800
Budget, 1931	78,000
Increase	21,200

The increase of $21,200 is submitted for the following purposes:

(1) $5,000 for carrying forward a study of the life histories, diseases and parasites of game animals and birds as a basis for efficient management of game species on national forests and Federal reservations. Only a very limited amount of work along this line is now possible with the one assistant now employed and there is great need for definite information on the subject in other areas which the Bureau is unable to supply until further investigations are conducted. The money is needed for salary and expenses of an associate biologist.

(2) $4,157 for the employment and expenses of an expert in taxonomy and distribution to make identifications and carry on work of this nature on birds and mammals collected by the Biological Survey and cooperating scientific agencies. This work is of great importance in carrying out the scientific work of the Bureau generally. $3,200 will be required for the salary and the remaining $957 is needed to meet the expenses of temporary field assistants and miscellaneous operating expenses. This division is extremely handicapped for funds to meet the most urgent needs for field work and operating expenses.

(3) $12,043 for forest wild life research authorized by the McSweeney-McNary Forest Research Act. This sum will permit of the employment for full-time service of two associate biologists who can be employed for only about eight months during the current fiscal year with funds now available, and will also permit of the employment of two additional associate biologists, including their expenses needed in making a detailed study of the occurrence, distribution, and habits of wild life and their relation to forestry production.

Wild life has an extremely important relation to forests. The starvation of deer in the Kaibab National Forest is a familiar example, although it is not so well known that the incident was attended not only by serious consequences to the deer herds but also to the forest in that reproduction was held at almost a standstill and more or less damage done to existing growth. The relation of sapsuckers to trees is an illustration of destructive activities of birds that needs careful investigation. On the other hand, we have the feeding of birds upon injurious forest insects such as the various wood-borers and bark beetles. The relation of birds to these insects is known to be important but is not understood in detail nor do we know whether the feeding activities of birds on other predators and parasites

of the injurious forest insects offset the good done to an important degree. Birds and mammals are agents in the distribution of the fruits and seeds of forest trees, but the extent of their usefulness in this direction is not accurately known. Both of these groups, and especially rodents among the mammals, are a check upon reforestation projects and these relations need to be thoroughly studied not only that we may properly establish the economic status of the forms concerned but that we may be in a better position to devise control methods.

This project contemplates adequate study of forms which constitute an important part of forest production such as game animals, fur-bearing animals, and game birds. The information to be gained from these studies will be of much value in the solution of pressing problems involved in this comprehensive research program.

Project Statement

Project	Expended 1929	Estimated 1930	Estimated 1931	Increase
Investigations of wild animal life.	$49,507	$48,843	$58,000	$9,157 (1-2)
Research in forest wild life. . . .	---	7,957	20,000	·12,043 (3)
Total.	49,507	56,800	78,000	·21,200

Activities under this Appropriation

Investigations of wild animal life: Field and laboratory investigations are made of the distribution, migration, classification, natural history, and ecology of wild animals and birds; and the distribution of zone indicating plants; and of the natural life zones of the Continent.

This research provides a sound basis of scientific facts required for use in the regulatory, economic, educational, and other work of the Bureau. Naturalists with temporary and permanent field stations conduct biological surveys and investigate the life history, the natural requirements, and the diseases and parasites of various species of big game, fur bearers and other mammals and birds in the wild. Examples of the bird and mammal life deposited in the Survey's extensive collections and the vast fund of information in its record files secured from field and laboratory studies over a period of approximately fifty years furnish the basis for revisions of genera, for authoritative reports on special animal groups and regions, and special reports and digests of information needed as a basis for administrative action. Big game constitute an important economic and recreational asset of the country. Naturalists of the Survey have for many years studied the habits of buffalo, mountain sheep, elk, deer, and antelope, and other big game animals. In 1927 more detailed investigations were begun to secure more complete and definite information regarding the habitat, food resources, abundance, general habits, diseases, and parasites and morphology of the elk, their relation to the livestock industry, management of herds, winter feeding, and the availability of surplus animals for hunting, together with studies of elk as food.

Investigations of deer were conducted chiefly in Pennsylvania, Virginia, Arizona, Utah, and Wyoming. Investigations are also conducted of the environmental needs, the life habits, and abundance of fur-bearing animals under natural conditions. Based on this study recommendations are made for improving conditions to increase production, for removing surplus numbers, for restocking depleted areas, or introducing them into localities favorable for their profitable production. Information was assembled from literature and other sources regarding conditions throughout the entire country. In addition to the work of the staff cooperation was secured from State game departments, universities, agricultural colleges, and experiment stations, museums, and several hundred individuals throughout the country who submit regular reports on wild life conditions.

In cooperation with the Carnegie Institution of Washington, the National Academy of Sciences, the National Research Council, the National Park Service, and the Forest Service, important studies were conducted of the wild life of the Grand Canyon of Arizona and of the life zones represented there. Progress has been made during the year in studies inaugurated by the Biological Survey in cooperation with the U. S. Public Health Service, the University of Minnesota and other agencies to determine the extent to which grouse, quail, and other gam birds are susceptible to tularemia, a rabbit-borne disease which affects man and many species of wild animals.

Biological Research in Forest Wild Life: Under the provisions of the McSweeney-McNary Bill, authorizing a program of research in forestry and wild life, work has been continued in formulating plans and in making necessary arrangements for launching effectively the program of research in the relationships which birds, mammals, and other vertebrate animals sustain to forestry development. Preliminary field investigations were made at a number of points and conferences were held with forestry and game officials as a basis for launch ing the research work effectively during the fiscal year 1930. These studies will include determination of the beneficial influences of wild life species, such as the distribution and planting of seeds of forest trees or the control of insects, rodents, or other species destructive to forestry interests, as well as detailed investigations of harmful activities such as destruction of seeds and seedlings, and killing or damaging the growing trees for market purposes or preying upon livestock, game, or other valuable products of the forests. It contemplates thorough study of forms which constitute an important part of fores production such as game animals, fur-bearing animals, and game birds. This includes the relation which such animals and birds sustain to forest and forage growth, means of maintaining proper numbers for thrifty conditions of the forests and utilization of its annual crop of by-products and their effect upon livestock production. Attention will also be given to forms that contribute to the interest and value of forests and national parks, for purposes of outdoor recreation.

New Language

The following provision has been added at the end of this item to cover the work under the project "Biological Research in Forest Wild Life": "and including $20,000 for investigations of the relations of wild-animal life to forests, under section 5 of the Act approved May 22, 1928."

BUREAU OF BIOLOGICAL SURVEY (Continued)

(f) PROTECTION OF MIGRATORY BIRDS

Appropriation, 1930	$173,013
Budget, 1931	192,000
Increase	18,987

The increase of $18,987 is submitted for the following purposes:

(1) $10,000 for boat on Potomac River and tributaries. A suitable boat for patrolling the waters of the Potomac, which is an important concentration area for migratory game birds, is a necessity for the efficient enforcement of the Migratory Bird Treaty Act and regulations in this area. The boat now used for this work was built in 1912, is now becoming old and undependable, and lacks the necessary speed to perform effective patrol work in the district indicated. A boat is needed in the upper Chesapeake Bay region which is also an important congregating ground for migratory birds, and the old boat can be used to good advantage in this area or elsewhere so long as it remains serviceable.

(2) $4,220 to provide needed personnel in the Washington office. The services of an administrative assistant at $2,600 and of a stenographer at $1,620 are urgently needed to enable the Migratory Bird Division to keep more nearly current the increasing administrative work under the Migratory Bird Treaty Act.

(3) $4,767 for additional personnel and expenses in investigational work. $1,440 is needed for one statistical clerk required in the assembling and tabulating of data received from a force of over 4000 voluntary cooperators in bird census work; $2,800 for the salary and expenses of an assistant in bird banding work and $527 for purchase of bird bands and equipment in order to make the bird-banding work more effective and to keep up to date the valuable data which is accumulating but can not be made available for use because of lack of help. The information obtained from these investigations forms the basis of important decisions and regulations affecting the whole enforcement work of the Bureau and it is, therefore, important that the results of these investigations be made available promptly and kept current and this can be done only through increases in present personnel.

Project Statement

Project	Expended 1929	Estimated 1930	Estimated 1931	Increase
Protection of migratory birds	$132,236	$133,371	$147,591	$14,220 (1-2)
Investigations of migratory birds..	19,187	20,800	25,567	4,767 (3)
Enforcement of the Lacey Act	15,872	18,842	18,842	-
Total	167,295	173,013	192,000	18,987

Activities under this Appropriation

General

The administration of the Migratory Bird Treaty legislation consists of the determination, adoption, and enforcement of suitable regulations for the protection of birds named in the treaty between the United States and Great Britain and which migrate between the United States and Canada. These birds include the many migratory insectivorous species which are so valuable to agriculture and horticulture, and also among other species the wild ducks, geese, brant, swans and shorebirds. Under this appropriation work is also conducted in enforcing the Lacey Act regulating interstate shipments of wild game and the importation of wild animals and birds from foreign countries. Investigations are also carried on to gain information which can be used as a basis in framing new regulations or amending old ones.

Protection of migratory birds: In the enforcement of the Migratory Bird Treaty Act Regulations, 25 full-time United States Game Protectors comprise the principal field force under the direction of the Washington office. Each of these protectors has a district comprising from one to several States or parts of States. They are assisted by the employment of a small number of United States Deputy Game Wardens for temporary periods from time to time. The field force utilizes Government-owned motor boats for water patrol work and most of the full-time employees also operate privately owned automobiles in connection with their land activities. The Federal service cooperates with State and local officials extensively in the enforcement of laws on wildlife conservation. The limited number of Federal employees engaged on this work confine their activities largely to strategic localities in which waterfowl and other migratory birds congregate in greatest numbers. Others areas in each district are protected so far as possible by occasional visits of the protector and through such cooperation as he is able to enlist from State and local authorities.

The Federal game protection work meets with a hearty response from the law abiding sportsmen, and it is due to this condition and the respect in which the Federal game protectors are generally held, that the results thus far have been achieved. These men and the Washington office are constantly endeavoring to educate the public to the necessity of game conservation if the sport of hunting migratory wild fowl is to be preserved for future generations. Notwithstanding these activities, many deliberate violations of the law occur and it is only through apprehension and prosecution of the guilty parties that any progress is made with certain types of violators. During the fiscal year 1929 these men reported for prosecution 153 more cases involving violations of the Migratory Bird Treaty Act than during 1928. The increase in convictions totalled 67, with a corresponding increase in fines and costs amounting to $2,155.90. The wood duck, on which there has been a perpetual closed season since the promulgation of the first Federal regulations in 1918, has shown a splendid increase in numbers. This species, if allowed to be hunted along with other ducks during the first 10 years, would undoubtedly have been on the verge of extinction at the present time.

Fifteen years ago canvasback ducks were almost rare in the Susquehanna

Flats, Chesapeake Bay, and North Carolina. Today they visit these regions by the tens of thousands, practically all due to the restrictions placed on wild duck hunting and the prohibition of the commercialization of migratory game birds.

The United States Game Protectors are of material aid in the enforcement of State game laws protecting birds, fish, and game. Such offenses against the State laws as come to the notice of protectors while engaged in the discharge of regular duties are reported to the proper law enforcement officials of the State, and as a direct result of this activity fines and costs totalling approximately $12,500 were collected by the States during the fiscal year 1929.

Publications under this project include an annual game law bulletin, game law poster, and a directory of officials and organizations concerned with the protection of birds and game.

Investigations of migratory birds: The biological investigational work is designed to secure information regarding the numbers, distribution, and migratory movements of waterfowl throughout North America as a basis for administrative action by the Department and cooperating agencies under provisions of the Migratory Bird Treaty Act with Great Britain. It includes field investigations by representatives of the Biological Survey and the assembling of information reported by 4,000 volunteer cooperators who submit monthly reports of waterfowl conditions found on selected areas through the country, and by 1,600 cooperators who operate bird banding stations as a means of determining migratory habits and migration routes. Particular attention has been given in the banding operations to ducks and geese, protected under Acts of Congress and regulations of the Department. Many tables and maps were prepared showing graphically the summarized results of the data contained in the thousands of reports submitted.

The economic investigations of migratory birds include chiefly studies of groups of birds such as the ducks, geese, and swan and the shorebirds, information on the food habits of which is in demand among sportsmen and others interested in these species. An important feature is the investigation of cases of damage by birds protected under the Federal Migratory Bird Treaty Act to learn whether modification of their protected status is desirable. The Secretary of Agriculture is empowered to issue orders permitting the killing of such of these birds as are found to be seriously destructive to agricultural and other interests, and in the course of years a number of such permits have been issued. Among them may be mentioned orders permitting the killing of fish-eating birds on the ground of fish hatcheries, of robins when found damaging small fruits in a number of the Northern States, and of gulls in various localities to prevent the pollution of water supplies. Under this project studies have also been made of the maladies responsible for the death of large numbers of waterfowl, especially in the Western States, since it seems likely that the causes of outbreaks of the so-called "duck sickness" can best be discovered through a study of the food and water supply of the birds. Part of

the trouble has already been diagnosed as alkali poisoning, and investigations are being carried on as rapidly as practicable in the hope of finding the cause and possibly a cure for these destructive disorders.

Enforcement of Lacey Act: The Lacey Act, regulating interstate commerce in wild animals, prohibits the delivery to a common carrier for transportation from one State to another, of the dead bodies of wild animals or parts thereof, including the skins of fur-bearing animals, which have been killed in violation of State law, or which are shipped contrary to the provisions of the law of the State from which transported.

The Act further prohibits the importation of wild animals and birds from foreign countries except under permit of the Secretary of Agriculture. The importation of certain injurious species is specifically prohibited, and since the enactment of this legislation no injurious species has gained a foothold in this country, as did the English sparrow prior to its enactment. The annual importations total approximately 500,000 wild animals and birds and include not only canaries and other species for the cage-bird traffic of the United States, but quail from Mexico and game birds from other foreign countries for propagation and restocking depleted native covers, and also black and silver foxes and other wild fur animals for propagation. An inspection service of these importations is provided at border points and the principal ports of entry.

In the enforcement of the provisions of the Lacey Act regulating interstate commerce in wild animals or parts thereof, information covering illegal shipments of furs and game animals is obtained by United States game protectors mainly from examinations of the records of raw-fur concerns at the larger receiving centers. Violations of this Federal law are predicated on infractions of the State law in regard to the killing or shipping of wild animals or parts thereof. Very satisfactory cooperation of the fur concerns in this Federal activity has been built up over a period of years. In the annual inspection of these records, information of from 4,000 to 5,000 apparently illegal interstate shipments are noted. In the absence of strict legislation on the transportation of the skins of fur-bearing animals in most of the States, few Federal prosecutions are undertaken under this activity. The information gathered which does not warrant further Federal investigation is turned over to State authorities and every assistance rendered them in cases where State prosecutions are undertaken. During the fiscal year 1929, this Federal cooperation resulted in the various States collecting $37,500 in penalties for violations of their game and fur laws. This cooperation with the States has been growing from year to year, and the possibilities recognized by this Federal service resulted in a reorganization of the Survey's method of handling the matter, and during the fiscal year 1929 an increase of State revenues in this regard of approximately $17,000 was noted.

Existing State legislation in most instances is insufficient to afford proper protection to beavers, otters, martens, fishers, and others of the more valuable fur-producing animals. Every possible cooperation and assistance is furnished the various States in the betterment of these conditions.

The Survey supplies carefully prepared information on the fur resources of the country and the trend of legislation for its protection in its annual Fur Law Bulletin, as an educational feature and as a means of assisting those interested in the conservation of fur animals in bringing about their adequate and proper protection. The responsibility for the protection of fur animals is solely that of the individual States and no attempt is made on the part of the Federal Government to assume this responsibility. The policy of the Department is that of cooperation and helping to advance the common interests of the public in the conservation of fur resources.

(g) REINDEER, GAME, AND FUR BEARERS IN ALASKA

Appropriation, 1930	$101,000
Budget, 1931	112,000
Increase	11,000

The increase of $11,000 is submitted for the following purposes:

(1) $2,150 for employment of an assistant at the Reindeer Experiment Station, Fairbanks, Alaska. He is needed to supervise and direct construction of fences and buildings, to care for animals, to oversee feeding, breeding, and other experiments and investigations, and to maintain routine records of results. The work at this station has developed to a point which necessitates the employment of a regular assistant to the superintendent to relieve him of routine work and insure adequate care of the animals at all times, including periods when he must of necessity be away from the station on other official matters.

(2) The increase of $8,850 is needed to meet certain of the Alaska Game Commission's most pressing needs in connection with the enforcement of the game and fur laws of the Territory. $4,000 is to provide for a new deckhouse for the sea-going boat "Seal." The deckhouse of this boat has developed many leaks which have deteriorated the wood to such an extent that the vessel is no longer seaworthy in rough water. If the house is not rebuilt or replaced, the damage will extend to the deck or deckbeams and the cost of replacement will be increased by a considerable amount. The remaining $4,850 is to provide for additional licensing officers needed in the sale of hunting licenses, for temporary office assistance in handling work at the Juneau office, for printing, for patrol work, and for boat operation and maintenance in connection with this work. With the present funds the Commission is required to greatly restrict its operations along all lines. It has had no increases in its regular funds since the fiscal year 1928, although operating expenses have continued to increase, especially in the operation of boats, which necessarily require more expense for repair as they increase in age.

BUREAU OF BIOLOGICAL SURVEY (Continued)

New Language

The following provision has been added at the end of this item: "Provided, That of this sum not more than $3,000 may be expended for the purchase of land and the construction of headquarters buildings for use of the warden at Fort Yukon, Alaska."

Project Statement

Project	Expended 1929	Estimated 1930	Estimated 1931	Increase	
Reindeer industry in Alaska	$ 23,096	$ 24,145	$ 26,295	$ 2,150	(1)
Protection of game and land fur-bearing animals in Alaska	76,571	76,855	85,705	8,850	(2)
Total	99,667	101,000	112,000	11,000	

Activities under this Appropriation

General

The work conducted in Alaska under this item pertains to the reindeer industry and to the protection of game and land fur-bearing animals in the Territory. The headquarters for the reindeer investigations are at Fairbanks where is maintained an experimental station in cooperation with the Alaska Agricultural College for the study of problems affecting these animals. A substation is located at Nome, near which are large herds of the reindeer. This Department cooperates with the Bureau of Education, Department of the Interior, in establishing sound management practices for producing and handling reindeer owned by the natives.

The enforcement of the game and fur laws is vested in the Alaska Game Commission composed of a resident commission of five members, four being resident citizens from the four judicial divisions of the Territory. The fifth is the chief representative of the Bureau resident in Alaska, who is executive officer and fiscal agent of the Commission. The headquarters of the Alaska Game Commission are at Juneau.

Reindeer industry in Alaska: Investigations for the improvement of the Alaska reindeer herds include feeding and cross-breeding experiments with reindeer and caribou, study of their diseases and parasites and of the forage resources of Alaska, grazing and herd management practices and rate of recovery of pasture ranges following overgrazing or fires. In cooperation

with other bureaus of the Department, studies were made of the chemical and physical character of reindeer meat, of its nutritive value and preparation for the table. Cooperation was continued with officials of the Bureau of Education, Department of the Interior, concerned with production and use of reindeer by the native population. The investigations were conducted at the Reindeer Experiment Station maintained in cooperation with the Alaska Agricultural College and School of Mines, at Fairbanks, Alaska, and at a number of experimental plats on the western coastal area, with substation headquarters at Nome. Nunivak Island was recently set aside by Executive Order for use in the cross-breeding experiments. Important information has been obtained regarding feed requirements on native forage and cultivated foods produced on farms in Alaska. Reindeer now constitute one of the important resources of the people of the Territory, and number considerably over 500,000 animals. The industry affords a basis for the social and economic development of the native people of Alaska.

Protection of game and land fur-bearing animals in Alaska: With the passage of the Act of January 13, 1925, known as the Alaska Game Law, the Alaska Game Commission was intrusted with the task of protecting the game and fur bearers in Alaska. The Bureau of Biological Survey transferred to the Commission such boats and other equipment as it possessed in the Territory. There are now a total of seven full-time wardens working under the Commission.

The revenue derived from the sale of licenses, from fines and sales of condemned and forfeited furs, guns, etc., has increased from $19,323 during the first year's operations to $65,750 for the year just completed. This revenue is, in accordance with the provisions of the Act, divided equally between the school fund of the Territory and the Federal Treasury. The revenue during the four years' operations has increased nearly 350 per cent, and the appropriation 18 per cent. During 1928 Alaska's fur stood fourth in the exports from the Territory, being exceeded only by fisheries Products amounting to $53,070,000, copper $6,781,000, and gold $6,640,000. The fur exports amounted to $4,298,000.

The game of Alaska plays a very important part in the economic welfare and development of the Territory. Due to the great distances and the few common carriers with their infrequent service, many sections of the Territory depend almost entirely upon game animals for their meat supply. Alaska's game has made it possible for the prospector to remain in the hills for long periods and also the development of small mining properties. The fur that the prospector is able to take duringthe winter assures him of his next summer's grubstake. The game fields are annually attracting more nonresident hunters to the Territory. During the past two years over one hundred of these hunters, who spent between $1,500 and $2,000 each on their hunting trips, visited Alaska. There are over two hundred people--guides, cooks, packers, boatmen, and horse wranglers--whose livelihood depends largely upon their employment in these capacities.

BUREAU OF BIOLOGICAL SURVEY (Continued)

(h) UPPER MISSISSIPPI RIVER WILD LIFE REFUGE

Appropriation, 1930	$190,600
Budget, 1931	197,000
Increase	6,400

An increase of $6,400 is submitted for the following purposes:

(1) $1,000 for additional posting of the refuge. The area of the refuge is continually increasing through additional acquisitions of land. The various tracts included within the refuge are so scattered that posting of the areas as acquired is necessary to keep the public advised regarding these protracted areas.

(2) $2,190 for transitman and for patrolling. This is needed because of the increased refuge area to be administered necessitating additional expense for travel and maintenance. It also will provide for one-half of the salary of a transitman whose services will be required in marking boundaries.

(3) $3,210 for fire protection. The total area of all lands within the Upper Mississippi River Wild Life and Fish Refuge boundary is 200,000 acres, of which there is an area of 136,000 acres susceptible to high fire hazard. This is a relative statement, however, due to the fact that the land within the refuge boundary is flat and intersected by sloughs which form natural fire breaks, with the result that there are safety factors not present on some other public lands. Nevertheless, fires once started spread rapidly and quick action is required to prevent destruction of large areas of game cover and forest growth. The types of land within the refuge include timber land 49%, marsh 20%, grazing 7%, grazing-timber 7%, hay land 5%, and miscellaneous land including brush and semi-marsh 12%. The money requested is for the employment of patrolmen and lookouts for short periods during periods of fire hazards, travel and subsistence expenses for these employees, and the construction of 2 lookout and patrol cabins.

Project Statement

Project	Expended, 1929	Estimated, 1930	Estimated, 1931	Increase
Administration	$ 37,921	$ 40,600	$ 47,000	$6,400 (1-2-3)
Acquisition of land	147,145	150,000	150,000	--
Total	185,066	190,600	197,000	6,400

BUREAU OF BIOLOGICAL SURVEY (Continued)

Activities under this Appropriation

General

This appropriation is being used for the acquisition of land and water areas to be set apart as a wild life and fish refuge along the upper Mississippi River, as authorized by the Act of June 7, 1924, as amended, and to cover the necessary administrative expenses incident to the purchase of the land and the maintenance of the refuge.

The Superintendent of the refuge maintains headquarters at Winona, Minnesota. The refuge includes areas in the States of Minnesota, Iowa, Wisconsin, and Illinois, and extends for a distance of approximately 300 miles along the river from Rock Island, Illinois, to Wabasha, Minnesota. When completed it will contain a land area of about 160,000 acres and a water area of over 100,00 acres. The response of wild life to the protection afforded on the areas already under administration, while not comparable with those to be expected after the completion of the acquisition program and the administration of the refuge as a unit, are most encouraging and augur well the future benefits to accrue to the wild life of the region.

Two principal lines of activity carried on under this appropriation are as follows:

Administration: Policing of 90,000 acres of land, and 100,000 acres of water under Government control, or which will be under control July 1, 1930.

There are numerous tracts scattered along the 300-mile stretch of the refuge, varying in width from 1 to 5 miles, and with a boundary line of almost 800 miles which makes the refuge difficult to post and police and requires a considerable force to afford the necessary protection from trespass and for fire prevention.

Acquisition of lands: Of the total of $1,500,000 authorized for acquisition of land by the Act of June 7, 1924, $536,000 has been appropriated up to and including the fiscal year 1930. Continuance of acquisition of lands within the exterior boundaries of the refuge is necessary to consolidate the holdings as rapidly as possible. There remains to be purchased about 50,000 acres, of which 16,500 acres should be paid for during the fiscal year 1931 at an average price of about $7 per acre. With about 275 separate tracts of land under Government control it is important that the intervening lands be acquired to consolidate the holdings and facilitate protection.

When the tracts are consolidated by the purchase of the intervening lands, the problem of patrol will be greatly simplified and the relative cost per acre for posting, surveying and policing will be much less than it is at present.

BUREAU OF BIOLOGICAL SURVEY (Continued)

(i) BEAR RIVER MIGRATORY BIRD REFUGE

Appropriation, 1930:	
Facial	$75,000
1929 unexpended balance reappropriated for 1930	161,816
Total available, 1930	236,816
Budget, 1931	94,000
Apparent decrease	142,816
(Actual increase	19,000)

There is an apparent decrease of $142,816 in this item which is due to the fact that of the $200,000 appropriated in the Second Deficiency Act for the fiscal years 1928 and 1929, $161,816 was unexpended at the close of the fiscal year 1929, and through reappropriation has been carried over for expenditure into the fiscal year 1930. This unexpended balance, together with the regular appropriation of $75,000, makes a total of $236,816 available for expenditure in the fiscal year 1930. As $94,000 is recommended for the fiscal year 1931, there is an apparent decrease of $142,816, but an actual increase of $19,000 over the regular appropriation of $75,000 for the fiscal year 1930. Of the $94,000 recommended for 1931, $75,000 is for the continuation of work on the establishment of the refuge and makes up the total of $350,000 which was authorized to be appropriated for this purpose under the Bear River Migratory Bird Refuge Act, approved April 23, 1928.

The increase of $19,000 is submitted for the following purposes:

This is to provide a new item for the administration and maintenance of this refuge. During the fiscal year 1931 it is expected that a considerable area will be flooded with water and established as a refuge for migratory birds, and it is therefore necessary to provide for the proper administration of this area. Of this $19,000 asked for, but $8,020 comprises new items, the remaining amount being for salaries and expenses of employees engaged in the work of establishing the refuge who are now being paid from the regular appropriation for the creation of the refuge. The $8,020 is to provide for warden and other service, for construction of necessary buildings and cabins, furniture and equipment, and miscellaneous expenses required to efficiently administer the refuge.

Changes in Language

The wording, "Second Deficiency Act approved May 29, 1928, and in the" is omitted as no longer necessary, and the following language has been added in place thereof: "Agricultural Appropriation Act for the fiscal year 1930 (45 Stat., pp. 1189-1221); and in addition to the sum above authorized to be appropriated $19,000, for administration and maintenance, including the construction of necessary buildings and for personal services in the District of Columbia and elsewhere."

This new language provides for making available in the new fiscal year any unexpended balance from the appropriation for 1930 which will be used in continuing the construction work and the establishment of the

refuge. It also provides for a new item under the head of administration and maintenance.

The proviso at end of item is also omitted as no longer necessary.

Project Statement

Project	Expended 1929	Estimated 1930	Estimated 1931	Increase or Decrease
Development and administration...	$38,131	*$206,206	**$75,000	-$131,206
Acquisition of land.....	--	30,610	--	- 30,610
Administration.....	--	--	19,000	+ 19,000
Total.....	38,131	*236,816	94,000	-142,816

*Includes $161,816 reappropriated funds.
**For development only.

Activities under this Appropriation

General

This project has for its purpose the flooding of considerable areas of barren mud flats that have formerly been so heavily impregnated with alkaline salts as to become, under certain conditions, veritable death traps for great numbers of migratory waterfowl and shorebirds.

Prior to July 1, 1930 the work under this project consists entirely of the acquisition of lands and water rights, the construction of dykes which will keep out the salt waters of the Lake and impound fresh water, ditches, spillways, stream control works, including headgates and the necessary surveying and tests in connection with the construction of shallow artificial fresh water lakes on mud flats at the edge of Bear River Bay, Great Salt Lake, Utah.

After July 1, 1930, the work will be of two classes. (1) Completion of construction work to the extent of authorized funds; and (2) administration of areas flooded prior to that date or immediately after, together with the maintenance of dykes already constructed. A portion of the project will be completed about July 1, 1930, or shortly thereafter. This will comprise a flooded area of approximately 30,000 acres, 22,000 feet of dykes and ditches, and river control works.

Administration of the area will consist in policing to prevent illegal hunting, the maintenance of the dyke, and improvement work such as the planting of desirable duckfood plants; the sodding of the banks, or otherwise inducing vegetation to grow on them. During the first year or two until the dykes become well settled and resistant to the action of the elements careful patrol and maintenance must be carried on to prevent breaks.

BUREAU OF BIOLOGICAL SURVEY (Continued)

(j) MIGRATORY BIRD CONSERVATION REFUGES

Appropriation, 1930 (Second Deficiency Act, 1929)	$80,000
Budget, 1931	205,000
Increase	125,000

The increase of $125,000 (authorized by the Migratory Bird Conservation Act, approved Feb. 18,1929) is submitted for the following purposes:

To continue the program of surveying and acquiring areas of land and water to be set aside as bird sanctuaries under the authorization of Congress contained in the Migratory Bird Conservation Act, approved Feb. 18, 1929. The $75,000 initial appropriation under the Act is being expended in the survey of various proposed areas in the States to determine their status and suitability for bird sanctuaries. This work will continue during the fiscal year 1931 with some addition in force to expedite the survey work and to negotiate for the purchase of necessary areas approved by the Migratory Bird Conservation Commission for purchase and establishment as bird sanctuaries. $116,200 of the increase is for the purchase of refuge areas.

Project Statement

Project	Estimated 1930	Estimated 1931	Increase or Decrease
Acquisition of refuge land	$49,550	$185,000	+$135,450
Food resources of migratory bird refuge areas	25,450	15,000	- 10,450
Migratory bird conservation commission	5,000	5,000	--
Total	80,000	205,000	+ 125,000

Activities under this Appropriation

General

Under the Migratory Bird Conservation Act of February 18, 1929, to establish refuges for migratory birds, approximately 125 potential units scattered throughout the United States have been selected for examination. Suggestions for additional units are continually being received from individuals and organizations interested in conservation, and such of them as seem desirable must be added to those already listed for examination. During the fiscal year 1931 it is the plan to inaugurate the program of acquiring the lands which are found desirable for use as migratory bird refuges.

Acquisition of refuge land: In the work of acquiring refuge land it is necessary to make land appraisals, carry on negotiations with land owners,

make boundary surveys and examinations of titles looking to the acquisition of lands by gift, lease, and purchase, with a view to finding and establishing suitable refuges as feeding, resting, and breeding grounds for migratory birds throughout the United States.

All lands privately owned which are to be acquired within areas suggested as refuges must be appraised so that intelligent negotiations may be carried on with the owners, to the end that lands be purchased at a figure commensurate with the true values.

Boundary surveys must be made of all lands to be acquired in the Eastern States where the public land surveys do not prevail. These surveys are necessary to determine the true boundaries of lands offered to the Government, to ascertain the acreage as a basis for settlement, for mapping as a basis for title examinations and future administration.

Titles to all lands to be acquired must be examined to the end that they prove satisfactory to the Attorney General before final settlement is made with the vendor.

Food resources of migratory bird refuge areas: In order that we may learn of their fitness for refuge purposes, proposed Federal migratory bird refuge sites must be subjected first to a thorough biological investigation. This includes primarily a survey of the food resources of the area, but takes into consideration also all natural factors bearing upon the desirability of the proposed refuge. A full description of the various features and usually maps showing the distribution of the vegetation are prepared and incidental information is gathered that may be of assistance to branches of the Bureau directly responsible for reporting on the bird population of the areas and the feasibility of acquiring them.

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BUREAU OF PUBLIC ROADS

(A) GENERAL ADMINISTRATIVE EXPENSES

Appropriation, 1930.....$70,500
Budget, 1931..... 70,500

Project Statement

Project	Expended, 1929	Estimated, 1930	Estimated, 1931
General Administration	70,000	70,500	70,500

Activities under this Appropriation

This appropriation is used largely for paying salaries of personnel in the organization units doing work of a general administrative nature.

(b) ROAD MANAGEMENT

Appropriation, 1930.....$65,000
Budget, 1931..... 65,000

Project Statement

Project	Expended, 1929	Estimated, 1930	Estimated, 1931
Highway transportation surveys	61,060	65,000	65,000

Activities under this Appropriation

Highway transportation surveys are being made to determine the present and expected future use of highway systems, which information forms the basis of planning programs of highway improvement. At the present time work is in progress on a transportation survey of the eleven Western States of Washington, Oregon, California, Idaho, Nevada, Arizona, Utah, Wyoming, Colorado, New Mexico and Nebraska. The work is being handled as a coordinated survey in cooperation with the State highway departments

BUREAU OF PUBLIC ROADS (continued)

(c) ROAD BUILDING AND MAINTENANCE

Appropriation, 1930.....$72,900
Budget, 1931..... 72,900

Project Statement

Project	Expended, 1929	Estimated 1930	Extimated 1931
Maintenance of experimental highways	11,548	12,000	12,000
Experiments in the use of local materials and road construction and maintenance studies	59,525	60,900	60,900
	71,073	72,900	72,900

Activities under this Appropriation

The work under this appropriation is carried forward under two general heads:

1. Maintenance of Experimental Highways. The maintenance and study of experimental roads constructed by the Bureau of Public Roads in past years in the vicinity of Washington is being continued. There are approximately 98,000 square yards of road surfaces of various types involved.

2. Experiments in the Use of Local Materials and Road Construction and Maintenance Studies. The subgrade investigations which have been carried on for several years are being continued. The investigations have for their purpose the determination of the physical laws governing the behavior of soils and the identification of the soil constituents which exert a major influence on behavior; the determination of the extent to which soil characteristics are influenced by the soil constituents and the extent to which they are influenced by the natural conditions in which the soils occur; the development and standardization of tests which will permit a laboratory identification of soils and the development of methods for identifying and mapping subgrade soils in the field; the classification or grouping of soils with respect to their efficiency as subgrades and the correlation of this grouping with the existing classification which has been developed for agricultural purposes; and the determination of methods for correcting undesirable subgrade conditions. The work is carried on in cooperation with the Bureau of Chemistry and Soils and the State Highway Departments. Developments under this study have great value in connection with the location and design of highways and it is considered one of the most important of the physical researches of the Bureau.

BUREAU OF PUBLIC ROADS (Continued)

Various treatments of sand-clay and top soil roads with bituminous materials have been made in cooperation with the State highway departments. Different construction methods were used and careful records of maintenance costs are being kept. Work of this kind develops economical methods of construction and maintenance for low cost improvements on lateral roads where traffic is lighter than on the main thoroughfares.

(d) AGRICULTURAL ENGINEERING

Appropriation, 1930.....	$287,000
Allotment from appropriation for special Corn Borer Research...	75,000
Total funds available 1930.....	362,000
Budget, 1931.....	392,000
Actual increase.....	30,000
(Apparent increase.....	105,000)

While there is an apparent increase of $105,000 in this appropriation, $75,000 is submitted for continuing under this appropriation, the research work on engineering which during 1929 and 1930 has been financed from the miscellaneous appropriation (reappropriation of unexpended balance of the $10,000,000 Corn Borer Appropriation) for special corn borer research, which for 1931 has been reduced accordingly.

The actual increase of $30,000 is submitted for the following purposes:

(1) $10,000 for a study of the engineering phases of cotton ginning, a cooperative project with the Bureau of Agricultural Economics. The object is to develop methods of cotton ginning that will avoid damage to fiber that results from present practices. It is estimated that in the staple area of the Yazoo Delta the losses due to damage of the fiber in ginning amount to about $15.00 per bale. It is probable that the same losses also apply to the staple areas in Arkansas and Louisiana. But little study has been given to the mechanical details of cotton ginning, that is, to the relation of different parts of the gin and their mutual action when in operation. Some recent preliminary studies seem to indicate that these losses due to fiber damage can be much reduced by exhaustive experimental studies of the mechanics of ginning. It is desired to work out definitely the effects of all of the operating conditions upon the cotton fiber with the view of improving the whole process of ginning.

(2) $5,000 for continuing and expanding a study in the vicinity of Medford, Oregon, of the irrigation of pears. This project is being conducted in cooperation with the Oregon Agricultural Experiment Station. There are relatively few areas where the production of pears is proving profitable. No systematic attempt has been made in the past to determine the relation between methods of irrigation and quantity of water used, to pear production both as to quantity and quality of product. Neither has attempt been made to determine what effects different methods of irrigation might have on the physical condition of the tree, other than size. A year ago the pear buyers of California penalized growers in certain areas by insisting on a lower price of their fruit upon the alleged ground of improper irrigation. The Medford area of Oregon is one of those sections penalized. The pear growers association thereupon requested the Department to cooperate with the Oregon Agricultural College in conducting research investigations to solve these problems. The results secured in the Medford area will be regional and will be applicable to other irrigated areas.

(3) $15,000 to enable the most effective prosecution of a study designed to improve fertilizer distributing machines with the ultimate object of securing a more efficient use of fertilizers. This project is to be in cooperation with the Bureau of Chemistry and Soils and certain State Agricultural Experiment Stations. To secure the best results, such a study must be carried on in part under controlled atmospheric conditions, to secure which the construction and equipment of a laboratory would be essential. The futility of conducting tests involving commercial fertilizers under uncontrolled atmospheric conditions already has been demonstrated. Without such controlled conditions the scope of the project would be necessarily be limited and the results would lack the reliability that should come from scientific research.

BUREAU OF PUBLIC ROADS (Continued)

Project Statement

Project	Estimated 1929	Estimated 1930	Estimated 1931	Increase
Advice and assistance	$44,398	$30,950	$30,950	
Studies of the utilization and apportionment of water for irrigation, and the organization, operation and maintenance of irrigation districts	83,597	85,700	90,700	$5,000 (2)
Investigation of design, construction, operation and maintenance of drainage structures and the organization and development of drainage districts, and control of erosion.	63,812	82,500	82,500	
Studies of farm structures and their appurtenances	13,379	25,250	25,250	
Studies of farm mechanical equipment	41,302	43,750	143,750	100,000(a)(1,3)
Studies of the transportation and storage of perishable products	4,137	5,000	5,000	
Landclearing investigations	9,198	13,850	13,850	
Total -	259,823	287,000	392,000	105,000

(a) Includes $75,000 transferred from Special Corn Borer Research appropriation, which is reduced accordingly.

BUREAU OF PUBLIC ROADS (Continued)

Activities under this Appropriation

General

Funds appropriated for agricultural engineering are devoted chiefly to research directed toward solving the engineering problems of agriculture. Considerable consulting service is rendered other bureaus of the Department and occasionally outside Government agencies in connection with their engineering problems. Research work is done chiefly in cooperation with other bureaus and with State agricultural experiment stations.

Advice and Assistance: Under this heading is included such work of the Division as relates to the giving out of practical information, includingthe preparation and printing of farmers' bulletins, the making of motion picture films, the handling of correspondence with the outside public, and other activities the object of which is to pass to the public the information resulting from research.

Studies of the Utilization and Apportionment of Water for Irrigation and the Organization, Operation, and Maintenance of Irrigation Districts: Chief among the studies in this field are those directed toward securing the best possible use of the limited water supply available for irrigation in the arid West. These studies, conducted in cooperation with State agencies, involve long-continued experimental investigations relating to the water requirement of plants, the conserving of off-season rainfall, the best methods of bringing water to the plants, and the prevention, so far as possible, of losses of water through evaporation and seepage. Other lines of inquiry are, the development of the best types of apparatus for measuring irrigation water, methods of overcoming the loss of capacity of irrigation canals and reservoirs due to silt and gravel deposits, the characteristics of flow in irrigation conduits of all types, and the best methods of cleaning and maintaining irrigation canals. Engineering-economic studies are made of irrigation enterprises that have found themselves in difficulties largely as a result of economic conditions that have existed since the World War, in an effort to develop practical procedures for the rehabilitation of such enterprises. Related to the problems of irrigation are those of drainage that develop as a result of irrigation due to the rise of ground water and the resulting surface concentration of alkalies. The development of methods of preventing water-logging of land and the reclamation of areas already damaged is one of the important lines of work in the irrigated West. Studies are under way in New Jersey, designed to develop the feasibility of irrigating with sewage derived from cities and institutions.

Investigation of Design, Construction, Operation, and Maintenance of Drainage Structures, the Organization and Development of Drainage Districts, and Control of Erosion: Research under this heading is designed to develop fundamental facts which when applied tend to result in more effective and more economical practice in draining agricultural land and to correct the disastrous effects of soil erosion, Determination of the

rate at which water must be removed to afford the best moisture conditions for growing crops is one that requires long continued study over wide areas representing the variations encountered in rainfall, topography, and soils. The results of these studies are issued from time to time and afford a basis for the design of efficient drainage channels. A five-year study is being made of the subject of pumping for drainage in the Mississippi Valley, chiefly to determine what are the most economical sources of power for such pumping. The question of the durability of tile when subjected to so-called "alkali" waters and to freezing is of high importance to the farmer. Cooperative studies in this subject have been continued several years in cooperation with Minnesota agencies, and a number of reports have been issued. A practical method of determining in advance of installation, by means of soil analyses, the best spacing and depth at which to lay drain tile has been continued for two years. If such a procedure can be developed it will be of great economic value as it will eliminate a large element of chance in tile drain installation. The work dealing with the correction and prevention of soil erosion is carried on under a specific appropriation of Congress, in cooperation with the Bureau of Chemistry and Soils and the Forest Service. Three experimental farms are now in operation. The primary purpose is to develop the types of terraces that will be effective against erosion and still give the minimum of interference with the use of modern farm machinery.

Studies of Farm Structures and Other Appurtenances: Farm building construction today consists largely in following precedent and is carried on without scientific knowledge of the conditions that should be taken into account. This applies not only to farm homes but to animal shelters and storages for crops. A major project in the Division at present is a study of the research now being done with reference to farm structures, and the formulation of a coordinated national program in which all available research agencies may engage in a correlated series of projects. The matter of storing grain on the farm is one that is now being given prominence as a step in the way of the orderly marketing of crops. An investigation of the best methods of heating greenhouses is in progress.

Studies of Farm Mechanical Equipment: In this field studies are under way with the object of improving existing farm machinery and developing new machinery to meet specific needs. The work with reference to the European corn borer that has been under way for some three years is an outstanding project. An example of the adaptation of commercial farm machinery to the needs of the corn borer situation is the development of attachments to several of the commercial corn harvesters, enabling the stalk to be cut close to the ground, the low cutting of corn being a well-recognized measure of corn borer control. In addition, there has been developed a stalk cutter

of the sled type that can be constructed by a farmer, as well as an implement for low cutting by hand. Other promising work comprises the development of rakes, burners, and plows, especially designed to leave a perfectly clean ground surface, as well as improvements of husker-shredders and ensilage cutters designed particularly to destroy the corn borer. Experimental work for the development of practical equipment for the pre-drying of seed cooton apparently has resulted in success. The equipment developed is being tried out by several planters in connection with the current cotton crop. Other important cooperative lines of research in progress are: A study of fertilizer distributing machinery with reference to cotton, and a continuation of the investigations of the performance of the combined harvester-thresher and the drying of grain by the use of artificial heat.

Investigation of the Transportation and Storage of Perishable Products: This investigation, conducted in cooperation with the Bureau of Plant Industry, seeks to solve mechanical problems involved in the transportation of fruits and vegetables, principally through improving the insulation qualities of refrigerator cars. Another phase of this project is the development of the most effective railway equipment for transporting fruits in the dead of winter from the Northwestern States to Eastern markets.

Land Clearing Investigations: Under this heading the Division is conducting, in cooperation with the University of Minnesota, extensive investigations of the best method of removing stumps, stones, and small growth, principally from fields now under cultivation. Studies of the feasibility of poisoning growing trees and brush as a means of hastening their decay also are in progress in Connecticut, North Carolina and Arkansas. The relation of the physical condition of the field- as to shape, size and the presence of obstructions such as stumps, stones, ditches, etc. - to economical cultivation with modern machinery, is believed to be much more significant than has been generally realized. Some preliminary work has indicated that experimental studies of this subject would be very profitable, especially in the South and possibly in the New England States.

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Note.- Also see Miscellaneous Section for "Federal-Aid Highway System;" and Mount Vernon Memorial Highway".

BUREAU OF AGRICULTURAL ECONOMICS

(a) GENERAL ADMINISTRATIVE EXPENSES

Appropriation, 1930 ..... $286,000
Budget, 1931 286,000

Project Statement

Project	Expended 1929	Estimated 1930	Estimated 1931
General Administration	$287,466	$ 286,000	$ 286,000

Activities under this appropriation

This appropriation is for expenses of the office of the Chief of the bureau, and of various service sections such as stenographic, photographic, audits and accounts, property and supplies, which serve the whole bureau.

(b) FARM MANAGEMENT AND PRACTICE

Appropriation, 1930 .....$409,000
Budget, 1931 437,000
Increase 28,000

The increase of $28,000 is submitted for the following purposes:

(1) $7,910 for inaugurating a study of crop and price insurance. There is urgent demand for information on crop insurance and certain private insurance organizations are attempting to develop forms of crop insurance at the present time. During the first session of the 70th Congress a resolution was adopted by the Senate (S. Res. #51) calling upon the Secretary of Agriculture for his views as to whether the insurance of farmers by the Federal Government against droughts, floods, storms and other hazards would be consistent with sound governmental and economic policies, and if so, under what conditions such insurance should be issued. The Department pointed out in reply to this resolution that there was urgent need for a study of this problem and that it was a proper function of the Government to conduct such study and to supply the necessary facts. Practically no statistical work has been done to approximate an actuarial basis for hazards to growing crops. Certain data are available on damage to crops from various causes, but these data must be given careful statistical analysis in order to furnish a basis for crop insurance.

The subject of price insurance has, up to the present time, received no study whatever, although there is an urgent and growing demand for information as to its feasibility, and as to the conditions under which it may be developed. No funds are being expended for the study of either crop or price insurance at the present time.

(2) $5,310 for the employment of one additional man to assist in studies of production credit, especially of the effect of production loans by dealers in farm products upon the expansion of production and upon rates to growers. Such loans are an important factor in production and it is necessary to obtain definite information on the subject. It is alleged that the furnishing of production credit by dealers is responsible for surpluses of certain crops, and definite information should be obtained covering this subject. It is well known that highly exorbitant rates are often paid by farmers for credit, and an effort should be made to bring about improvement in farmers' credit facilities.

(3) $5,000 for the development of a comprehensive and authoritative annual survey of the farm real estate situation. The recent large losses in farm land values and farm mortgages, and a future prospect, which is radically different than in pre-war experiences, have aroused a new demand for statistical information and research in valuation problems. The demand is particularly urgent for data applicable to distinctive agricultural areas and districts. Generalized data for an entire State, therefore, are insufficient. It is proposed to replace the present estimates of values insofar as practicable by compilations of actual current sales prices paid. The present estimates of the annual volume of foreclosures, voluntary sales, etc., will be replaced by similar reports from the official county and State records. From county records other needed new data will be obtained such as the ratio of mortgage debt to sales price, the ratio of assessed values to sales prices and mortgage rates of interest, and taxes on real estate delinquent, etc. A current index of gross and net land earnings and of the relationship of current land prices to these incomes will be developed. A reporting list of country real estate dealers, country bankers, appraisers and other business men closely identified with farm lands will be made up in order to obtain information difficult to obtain from other sources. Working contacts will be developed with selected institutions such as life insurance companies and land banks, and in all cases endeavor will be made to make the information representative enough to be applicable to distinctive agricultural areas within States.

(4) $9,780 for the expansion of studies relating to types of farming systems of farming, and of the necessary adjustments in agriculture to meet the changed economic conditions. Research in farm management has been expanding very rapidly in the State colleges and experiment stations in the past few years, and the personnel of the farm management division of this bureau must be enlarged in order to cooperate with the State colleges in the most effective way. The increase will be used to provide funds for the employment of regional specialists who, working in cooperation with members of the various State Colleges, will give attention to the special problem of each of the agricultural regions of the country and determine for each type-of-farming area the programs of production and systems of farming that are likely to be most profitable. The objectives will be as follows: First, to determine the most profitable system of farming in each of the type-of-farming

Regions. Second, to analyze the forces and conditions making for long-time and short-time changes in the most profitable types of organization, so as to be able to point out changes needed to keep the farming programs for the country adjusted to current conditions. Third, to develop effective methods of cost analysis, farm planning and budgeting for use by farmers in planning their operations. Fourth, to study the relations of the farmers' problems of successful business organization for farm production to the State, regional, and national agricultural situation and policies. Further, it is proposed to study present conditions in all important lines of production to ascertain the degree of range of efficiency now being realized on American farms and the relative merits of the various methods and operations under different sets of conditions; and to discover and adapt new and more efficient methods, and, particularly to study the economic use and application of the new and rapidly developing farm machinery and the practices made necessary by its adoption.

Project Statement

Project	Expended 1929	Estimated 1930	Estimated 1931	Increase or Decrease
Agricultural Finance	$ 42,618	$ 55,164	$ 68,384	$ 13,220 (1-2)
Land economics and utilization	102,720	103,126	108,126	5,000 (3)
Farm population and rural life	33,368	33,320	33,320	-
Farm management	88,757	99,740	109,520	9,780 (4)
Cost of production	110,569	117,650	117,650	-
Total	378,032	409,000	437,000	28,000

Activities under this Appropriation

General

The economic research work of the bureau dealing primarily with production problems is done chiefly under this appropriation. This includes farm organization and management problems, cost of production, agricultural credit, insurance, taxation, farm ownership and tenancy, labor, land settlement and utilization, and farm life problems.

Agricultural Finance: Studies of farm taxation have been undertaken in cooperation with a number of States. From data collected it has been estimated that in some sections more than 50 per cent of the net rent of land is taken by taxes. Assistance is being given to State agencies in working out revisions in taxing systems. Studies of farm credit show that approximately 75 per cent of all farms use seasonal credit. Efforts are being made by this bureau in cooperation with other agencies to improve farmers' credit facilities and make it possible for them to obtain needed credit at reasonable rates. The question of credit is studied in relation to farm management and marketing problems. Study is being given to the problems connected with farmers' mutual fire insurance and improved methods and practices have been recommended.

BUREAU OF AGRICULTURAL ECONOMICS (Continued)

Land Economics and Land Utilization: Studies are made of the causes of agricultural surpluses. The effect of the use of improved machinery such as the tractor, and of increased yield per acre, etc., with resultant geographic shifts in crop and livestock production have been studied for the purpose of estimating probable changes in need for farm land, and for formulating land utilization policies. Maps showing shifts in production have been published and an index of agricultural production is under way. Cooperative work is being carried on with States in working out programs for marginal and submarginal lands.

Farm Population and Rural Life: Under the Purnell Act a sum of between $90,000 and $100,000 has been allocated to sociological research at the Experiment Stations in 25 States. This bureau has cooperated to some extent in practically all of the projects which have been under way, including studies of the composition and changes in rural population, rural community organizations, social aspects of farmers' local municipalities, and movement of population to and from farms. Special study has been given to the social aspects of problems of cooperative organizations. Concrete suggestions have been made in a number of cases with regard to bringing about more active support of organizations by members through better dissemination of accurate information on the part of the management.

Farm Management: Closer cooperation has been maintained each year with State agricultural colleges and experiment stations in working out farm programs. Detailed analyses of types of farming have been made during the past year in Indiana, Kansas, Michigan, Minnesota, Nebraska, North Dakota, South Dakota and Oklahoma. The results of these studies have already been used to good advantage in interpreting the national outlook to local extension men and to farmers in terms of the conditions prevailing in the different areas in each State. Local agricultural workers make specific recommendations as to the curtailment or expansion of acreages to be planted of certain crops in particular sections, in the light of information furnished by the United States Department of Agriculture. In cooperation with other divisions of the bureau complete analyses have been made of the present status and future prospects with regard to certain crops. Apples, peaches and grapes have been covered by surveys and a survey of pecans is under way. Information is obtained on numbers and ages of trees, by variety. Outlets and consumer preferences have been studied and definite recommendations have been made for curtailment or expansion of planting of certain varieties in various sections. Constant work is being carried on in connection with improvement of machinery and methods.

Costs of Production: Information is published annually on the costs of producing a number of the principal agricultural products. Various methods are compared with regard to costs and general efficiency. For example, data have been compiled to show the relative costs of harvesting by combine as compared with other equipment, for varying numbers of acres. Costs of sledding cotton as compared to other methods have been worked out and published as well as information on other factors connected with harvesting. A study has been made of large scale farming, and the relative advantages and disadvantages pointed out.

BUREAU OF AGRICULTURAL ECONOMICS (Continued)

A new line of work called "Farm Budgeting" has been undertaken with the State colleges in Kentucky, North Carolina, North Dakota and Minnesota in which definite farm plans for the coming year are worked out with farmers. Accounts kept by farmers are analyzed and suggestions made for the next year's operation. Farmers adjust their systems of farming when the outlook for a particular product indicates that a profitable change can be made. This type of work serves to put the information available in the Department into actual use by individual farmers.

(c) MARKETING AND DISTRIBUTING FARM PRODUCTS

Appropriation, 1930	$774,900
Budget, 1931	836,800
Increase	61,900

There is an apparent increase of $61,900 in this appropriation, but due to a reduction of $5,200 proposed to be transferred to the Bureau of Home Economics for continuation by that bureau, of cotton utilization investigations, there is an actual increase of $67,100 which is submitted for the following purposes:

(1) $10,000 for the inauguration of a new project on the direct marketing of livestock. Marked changes have been taking place in the methods and practices of marketing livestock, particularly hogs and stockers and feeder cattle, resulting in the material development in direct marketing of hogs to packers and of stocker and feeder cattle from range to feed lots. Changes which vitally affect the welfare of the various interests concerned in the marketing of livestock have resulted in much confusion and controversy, causing many producers and others interested in the marketing of livestock to appeal to this bureau for information. Legislation has been proposed to regulate direct buying activities. No study as yet has been attempted to determine the advantages or disadvantages of this method, or its possible economic effects on the future of the livestock industry. Other problems need to be studied and the results published for the guidance of producers, shippers and the trade. The increase will permit of the employment of an economist with sufficient assistance to make a thorough study of this subject. An amount of approximately $2,500 will be expended on this work during the current year.

(2) $12,000 for studies of the marketing and standardization of alfalfa meal, beans and soybeans. There is urgent need for the expansion of this work and studies are needed to determine the relationship of protein and other factors in alfalfa meal and the best methods of handling determinations of such factors in alfalfa meal standards. There has been a steady demand for the promulgation of standards for alfalfa meal and a specific item of $5,000 was appropriated for the fiscal year 1929 for starting this work, but it has been found that extensive field

work and a large amount of laboratory study will be necessary before satisfactory standards can be worked out. Large quantities of alfalfa meal are now being shipped especially in States affected by quarantine against the shipment of alfalfa hay because of weevils, and the bureau is being urged to expedite the promulgation of standards. Very troublesome problems have arisen also in connection with the limits of safety for moisture in the standards for beans and soybeans which will require both laboratory study and field observations.

(3) $10,000 for the purpose of making laboratory studies of cotton fiber. The fundamental unit of cotton marketing as well as cotton breeding and production, is the single fiber, whereas the fundamental basis for spinning and weaving is the array of fibers. The spinning qualities and yarn properties which any given cotton possesses is determined by the dimensions and characteristics of the fibers themselves, individually and collectively. No satisfactory information is available concerning the interrelationships between the fiber properties and those of the corresponding finished products. No indices of spinning quality in terms of scientific measurements of the raw cotton itself are available. In cases of dispute, controversy, normal or abnormal conditions, the Department finds itself without adequate facts and detailed information. There is urgent need for an interpretation of the present grade and staple standards, and a more scientific and stable basis for a revision of these and for the development of standards for character. Information of this type is not only fundamental to a proper understanding and solution of standardization and marketing problems, but also of quality problems in the field of production, on the one hand, and those in the field of manufacture, on the other. An amount of $32,880 is available for the entire project on Cotton Standards and testing.

(4) $25,000 for further development of outlook work. The first definite appropriation, an amount of $68,220, was made for this work in 1929. The new appropriations made possible the employment of a number of specialists to devote their entire time to gethering and analyzing data bearing upon the agricultural situation. Much additional statistical and analytical work remains to be done, however, before the bureau will be in position to meet the demands for economic information needed as a basis for intelligent planning of farm operations, and therefore a marked expansion of the work is needed during 1931.

This work involves research studies on the fundamental principles underlying the production and marketing of farm products and it is highly desirable to extend the work to the point where it can be of maximum usefulness. This will require additional intensive research work and the collection of additional basic information. The importance of adjusting agricultural production to meet probable demand is now widely recognized and this work has become basic to the activities of the Department of Agriculture and to many State colleges and experiment stations. Many requests have been received for assistance in extending and localizing

the agricultural outlook information so as to be of the greatest benefit to particular localities. Additional funds will be needed for the employment of men trained in research and extension methods to assist the State colleges in developing farming programs for the different types of farming areas which in the light of the outlook will give the best results to farmers.

The project "Market Demand Analysis", which was carried under the same appropriation, has been added to the outlook work for the fiscal year 1930. This project was in existence before the outlook money was appropriated but as the purposes are identical, the two have been combined, making a total of $96,491 available for outlook work for 1930.

(5) $10,100 for research work in the production, handling, and marketing of tobacco. Although tobacco is one of our leading crops, both in point of production and foreign trade, up to the present time little economic research work dealing with this commodity has been done by the Bureau. Certain of the important tobacco growing areas are in a serious situation at the present time as a result of changing habits of consumers, excessive production and increased competition from foreign countries. Growers and cooperative organizations are in need of the best information obtainable with regard to the trends of consumption both here and abroad and the prospect for tobacco growing in principal competing countries. Frequent requests are made of this bureau by cooperative organizations, State marketing institutions and the trade for information which will help them to solve their marketing problems. The lack of basic statistical information and of trained and experienced personnel makes it impossible for the bureau to render the service needed at the present time. No funds are being expended for this purpose at present.

Project Statement

Project	Expended 1929	Estimated 1930	Estimated 1931	Increase or Decrease
Marketing fruits & vegetables	$ 90,061	$ 86,660	$ 86,660	-
Market price trends and transportations	110,214	124,370	124,370	-
Marketing livestock, meats & wool	77,451	83,140	93,140	+ 10,000 (1)
Marketing dairy and poultry products	33,762	38,522	38,522	-
Marketing hay, feed and seed	52,898	52,420	64,420	+ 12,000 (2)
Cotton handling and marketing	30,553	33,850	33,850	-
Cotton standards and testing	30,324	32,880	42,880	+ 10,000 (3)
Utilization of cotton	35,398	38,100	32,900	- 5,200 *
Southwestern cotton marketing research	-	8,967	8,967	-
State cooperation in marketing work	44,442	47,840	47,840	-
Grain investigations	98,376	96,940	96,940	-
Market information	34,865	34,720	34,720	-
Outlook reports	91,653	96,491	121,491	+ 25,000 (4)
Marketing tobacco	-	-	10,100	+ 10,100 (5)
Total	729,997	774,900	836,800	+ 61,900

* Transferred to Bureau of Home Economics in 1931 Budget.

BUREAU OF AGRICULTURAL ECONOMICS (Continued)

Activities under this Appropriation

General

This appropriation is devoted very largely to research work on the economic problems of marketing. In addition the physical problems connected with handling, grading, packing, shipping and marketing of products are studied and recommendations are made for improvements. Numerous laboratory studies are carried on, such as spinning tests of various types and grades of cotton, milling, baking and chemical tests connected with the grading of grain. Work is being done to establish additional uses for cotton. Standardized grades have been prepared for a large number of products and demonstrational work is carried on to educate the producers and the trade in their use.

Marketing fruits and vegetables: United States standards for 44 fruits and vegetables have been recommended. Since two or more sets of standards are necessary for different types of the same commodity which vary widely, a total of 57 standards have been issued. Work is being done on a number of additional products and constant work is being done in explaining and demonstrating the standards and changing them when it appears that a modification will be advantageous to the users. Progress has been made in establishing standards for cannery products. This work is popular with both the producers and the canners. Some attention has been given to flower bulbs. Many of the United States standards for fruits and vegetables have been adopted by various States and their use made mandatory under State laws. They serve as the basis for the market news and inspection services of the bureau, and a number of them are employed in the warehousing of products under the Warehouse Act.

A series of bulletins is being prepared on the origin and distribution of certain fruit and vegetable crops, which is proving of value to those interested in those crops, and much detailed information is published on conditions and practices in important producing areas and markets for various crops.

Market Price Trends and Transportation: The issuance every month of a mimeographed report entitled "The Price Situation" has proved to be of benefit to farmers and others. This report analyzes all available information on the general situation and points out the factors which influence the prices of various products, and what the probable future trends in prices will be. The monthly price-situation report is of value to State statisticians and economists who use it in preparing local reports and in planning production programs. Detailed analyses of an extremely large volume of information is necessary in order to put the significant facts before the public. This work is closely associated with and forms a part of the basis for the outlook reports.

BUREAU OF AGRICULTURAL ECONOMICS (Continued)

Marketing Livestock, Meats and Wool: The constantly increasing demand for information on grade standards, consumer preferences, market demands, marketing methods, and the economic factors affecting market prices has made it necessary to expand the educational activities. One representative of the bureau has devoted practically his entire time in meeting requests for livestock grading demonstrations which have been attended by hundreds of farmers and others interested in the grading of livestock. These demonstrations are followed by demonstrations of meat grades and the correlation between the grade of the live animal and of the carcass is shown. Lamb cutting demonstrations have been held in cooperation with the National Livestock and Meat Board and motion pictures have been prepared demonstrating the grades and methods of cutting. Exhibits demonstrating the classes and grades of meat were prepared for 9 livestock shows and expositions. The report on the purebred livestock sale price survey summarized the price on 73,885 purebred animals. This report keeps buyers and sellers informed and tends to stimulate the demand for purebreds. Work has been started in developing standardized grades for hides and skins. Approximately 3,700 copies of the Tentative Schedule of Market Classes and Grades of Hides and Skins have been sent out to producers, dealers and tanners for suggestion and criticism. A beginning has been made in obtaining information on the direct buying of hogs in response to urgent requests for information on the subject.

Marketing Dairy and Poultry Products: This project covers investigational and demonstrational work on the marketing of dairy and poultry products Standards have been prepared for butter, cheese and eggs, live and dressed poultry, and standards for turkeys have been formulated and will be used in grading work this season after which they will be modified if necessary to meet the needs of the trade. A large part of the grading work is carried on in cooperation with State Agencies, the Federal bureau giving instruction and supervision. Studies are made of factors influencing the marketing of these products, of price quotations, and trade and exchange practices. The marketing of dairy and poultry products has become of tremendous importance in recent years, both on account of the large volume and value of the products, and the very large number of individual producers who depend upon the Department for advice and guidance.

Hay Standardization: A special campaign of educational work has been conducted on the methods of harvesting, baling, and storing necessary to the production of high grade alfalfa hay. Farmers' Bulletin No. 1539, "High Grade Alfalfa Hay, Methods of Production, Baling and Loading for Market" has been prepared and distributed among producers and shippers of alfalfa hay in the most important alfalfa producing States. The demand for this bulletin has been so great that a second edition of 30,000 copies was necessary in order to meet requests.

Hay grading demonstrations have been held before producers, dealers and feeders of hay at many points throughout the hay producing States. In cooperation with the Chicago International Livestock Show and various State colleges, a hay judging contest was held in connection with the Chicago Show, and instructions given to college students and others on the Federal grades. A number of contests were held at colleges in the Western States and an exhibit was made at the Pacific International Livestock Exhibition. An exceptionally large number of type samples of hay were prepared for the use of State workers, shipping associations, and hay exchanges in demonstrating the United States standards.

Work has been continued on the measurements of hay in stacks for the purpose of formulating rules for determining the volume of hay in stacks and the number of cubic feet of hay necessary to make a ton. Since large quantities of alfalfa hay in the Western States are sold in the stack, accurate rules for determining the number of tons in such stacks are of great importance. During the past two seasons, data have been obtained from 2,461 stacks and these data are being tabulated and analyzed. This study will be completed and a bulletin on rules for measuring hay in stacks and mows will be published as soon as possible.

Following a period of research work on soybean hay, conducted in cooperation with the Alabama Polytechnic Institute and the Alabama Farm Bureau Federation, hearings were held and tentative United States standards for soybean hay were promulgated. This work has been of great interest throughout the soybean producing area. The United States standards have been adopted as the official standards in Alabama and are being used at important terminal markets for this product.

Cotton Handling and Marketing: Special attention is being given to determining the effect of different types of gin machinery and methods of ginning on the quality of cotton. Many complaints are received that cotton is damaged by faulty ginning, and effort is being made to determine by experiment what the best equipment and ginning practices are.

Further work is being done on grading problems. Extreme difficulty is experienced in deciding controversies over the grade, staple length, and other factors affecting the value of cotton, and effort is being made to reduce the tests to mathematical or other exact bases.

Utilization of Cotton: This Department is cooperating with the Department of Commerce and the Cotton Textile Institute (Inc.) in studying the utilization of cotton and in developing new and extended uses. Basic data are now being assembled on trends of mill consumption of cotton of various growths. Data have been gathered on the production, consumption, prices, exports and imports by countries of the various fibers competing with cotton to be used in studying the trend in world consumption of cotton and other fibers.

Many tests have been made of cotton bags for various products, cotton bale covering, etc., and reports have been published setting forth the advantages of cotton over other fibers, and the relative costs involved. A large potential field for the use of cotton bags has been revealed by this work.

Southwestern Cotton Marketing Research: An amount of $8,967 was appropriated for the current year for a study of the problems relating to the alleged discrimination against the cotton from the irrigated sections of the Southwest. Work has been begun upon gathering data and making ginning and spinning tests to locate factors which may be responsible for certain defects, either in producing or handling methods.

State Cooperation in Marketing Work: This section carries a number of cooperative projects with States and other agencies on research problems connected with handling and marketing farm products. The New England Research Council, The Port of New York Authority and a number of other similar organizations, participate in the work as well as State and local agencies.

Grain Investigation: This section handles the research problems connected with the formulation of standardized grades for grain and with the application of such grades under the Grain Standards Act. Grain cleaning equipment has been devised and demonstrational work has been carried on to bring about improved methods of harvesting and handling grain. Many technical problems are involved in the grading of grain which require constant laboratory study. For example, the protein content in wheat is a highly important factor in determining the value of the product. Milling and baking tests are made and research work is being done in an effort to meet the demands of the grain producers and buyers.

Market Information: This section covers the editorial work connected with the preparation of the bulletins, periodicals, and various types of printed and mimeographed publications of the bureau.

Outlook Reports: The first specific appropriation for agricultural outlook work was made for the fiscal year 1929. Previous to that time such a report had been prepared by members of the staff who were engaged in other work. Much statistical and analytical work remains to be done before the bureau will be in position to meet fully the demands for economic information needed as a basis for intelligent planning of farm operations.

The outlook report for 1929, which was issued in February, was enlarged to cover in condensed form the results of analyses of all available data for 38 of the most important farm products or groups of products. These data covered both domestic and world conditions of supply and demand and pointed out the probable future trends in production and prices. Farmers were advised as to opportunities for profitable expansion of certain activities and warned against over-expansion of others. A large number of State agencies cooperated with the bureau in this work and published further detailed information for the benefit of their particular States and sections and used it in making specific recommendations for reduction or expansion of acreages of various crops.

BUREAU OF AGRICULTURAL ECONOMICS (Continued)

(d) CROP AND LIVESTOCK ESTIMATES

Appropriation, 1930	$845,000
Budget, 1931	950,000
Increase	105,000

The increase of $105,000 is submitted for the following reasons:

(1) $65,000 for statistics of dairy products: At present the only statistics available on the total production of milk are the Census reports and an annual statement issued by this bureau on the approximate quantity of milk required to produce the dairy products manufactured in the United States, and certain figures on city receipts of milk as reported by boards of health. These figures are not sufficiently timely to give adequate indication of the trends in production. Milk, perhaps, is the most important product of this country for which no adequate statistics are available. Profits of dairymen are dependent on the spread between the cost of feed and the price of milk or milk products sold. This price spread varies constantly from month to month, and there is corresponding variation in the returns from dairying. Prices of dairy products are very sensitive to changes in the supply. For this reason , dairymen should have adequate information in time to allow the necessary adjustments. Only about $5,000 is being used for this work at present.

(2) $40,000 to provide for a more adequate development of the Foreign Service of the Department of Agriculture. The Federal Farm Board has called upon this bureau for information on production in foreign countries which compete with agricultural production in the United States. In many cases only limited information is available, since governments in most foreign countries do not make reports which are at all comparable to the crop reports made by this department. This increase will make it possible for this bureau to collect more information relative to agricultural resources and prospective developments in production in foreign countries; and to collect more information with respect to demand for, and other conditions that affect the prices of farm products in foreign countries.

Trained crop estimators are needed in the foreign field to gather these data. This information is needed for use in organizing and planning production in the United States and in the marketing of farm products in foreign countries as well as in the United States. The increase will provide also for more effective distribution of such information.

It is proposed to strengthen the office force at London for the purpose of collecting more information as to conditions of the market in the United Kingdom; to reestablish an office at Buenos Aires for reporting upon crop and livestock conditions in Argentina, Uruguay and Brazil, also to assist in marketing such farm products from the United States as may find a market in this territory; to place a fruit specialist in the Orient to make surveys of the

possibility of marketing fruit in Japan and China and assist in developing outlets for American fruit in the Orient; to place a livestock and meat specialist and a grain specialist in Europe to cover all European countries buying meats and grain from the United States, and to report upon conditions that effect the markets and upon competition which American products may be expected to meet.

It is apparent that if the Department is to be of maximum service to the American Farmer in planning the production or the marketing of his products in foreign countries as well as in the United States, it must collect more information both as to production in foreign countries and as to conditions that affect consumption of or demand for agricultural products in foreign countries. The Department with its intimate knowledge of the American farmers and its close contact with the farmers' problems through extension agencies, is in position to make extensive use of all available data as to productionand market conditions in foreign countries. Furthermore, it seems necessary to develop further the collection of information and the services of the Department in marketing products in foreign countries, to enable the Department to carry out effectively programs already established within the United States. An amount of $113,000 is being used in the foreign work at present.

Project Statement

Project	Expended 1929	Estimated 1930	Estimated 1931	Increase
Crop and Livestock reports ...	$599,098	$648,840	$713,840	$ 65,000 (1)
Production and marketing statistics	82,732	83,160	83,160	-
Foreign Competition and demand	99,270	113,000	153,000	40,000 (2)
Total	781,100	845,000	950,000	105,000

Activities under this Appropriation

General

This appropriation consists of two services, ie. Crop and Livestock Estimates and Foreign Competition and Demand.

Crop and Livestock Reports: Under this division, all of the estimates of acreages and forecasts of the production of the various crops and statistics of numbers and value of livestock and livestock products, are prepared as well as a large volume of related information. The reports cover approximately 60 separate commodities, or groups of commodities. The work is carried on cooperatively in 32 States, the States contribution amounting to more than $200,000 which makes possible more intensive work and better dissemination of the information within the States concerned.

BUREAU OF AGRICULTURAL ECONOMICS (Continued)

Production and Marketing Statistics: This section compiles, tabulates, and analyzes statistics gathered by the Division of Crop Estimates, and by other service divisions of the bureau. The data are prepared for publication in statistical bulletins, yearbook articles, current periodicals, and are used as the bases for research studies.

Foreign Competition and Demand: Information relating to foreign crop and market conditions is now being collected annually through the established offices of the Department of Agriculture in foreign countries, the Consular Service of the Department of State, the foreign service of the Department of Commerce, and the International Institute of Agriculture. An exchange of information directly with governments and with private agencies adds materially to the information collected through the above channels. The Consular Service contributes timely cables on shipments to the United States, crop prospects, stocks at important points, prices, and other important information about the markets, and more extensive written reports concerning crop and market conditions. In the past year Consular Reports have averaged more than 600 per month, making a total of nearly 7,500 reports for the year. The foreign-service officers of the Department of Commerce also have contributed information as to agricultural conditions in foreign countries, stocks, and particularly economic conditions affecting the demand for agricultural products.

(e) MARKET INSPECTION OF PERISHABLE FOODS

Appropriation, 1930	$440,000
Budget, 1931	475,000
Increase	35,000

The increase of $35,000 is submitted for the following purposes:

(1) $5,000 for the employment of one additional supervisor to meet the pressing demand for expansion of the service on poultry and eggs. The demand for this work is increasing, as producers and the trade are realizing more and more the value of the Federal Certificate. It will be possible through the additional supervision to extend the service to a number of new points where cooperation is requested by State and local agencies. Approximately $12,000 is being used for this purpose during the current year.

(2) $5,000 for the employment of one additional supervisor to meet the increased demand for hay inspection and seed verification work. The demand for the service has outgrown the bureau's facilities. One additional employee is urgently needed in Kansas City, and an additional amount also is required for travel and for clerical assistance. An amount of $54,709 is being used for the entire section at present.

(3) $20,000 for expanding the beef grading and stamping service. This service has become popular with all branches of the trade, especially with producers' organizations and retail meat dealers. It enables consumers to purchase the quality or grade desired, since the stamp appears on retail cuts. Experience thus far has shown that consumers are willing to pay for better quality, when the Government stamp assures them that they are getting the quality for which they pay. Practically all livestock organizations have during the past year, passed resolutions endorsing the Department's beef grading and stamping service and recommending that sufficient funds be provided to put it on a national basis. Similar resolutions were adopted by the National Association of Retail Meat Dealers, the National Livestock and Meat Board, and other organizations. The increase recommended will provide for the inauguration of the service at several additional markets and for additional help at points where a limited service now is being maintained. The allotment to the meat grading project (including the "beef grading service") for the current year is $22,150.

(4) $5,000 to inaugurate an inspection service on rice. This increase will provide for a grading service in California, Louisiana, and Texas in cooperation with State authorities. An experimental service is being carried on at the present time in Texas and California. Rice is a very important crop in the three States mentioned, and there is an active demand for this service. The Federal Government will furnish supervision, only, the actual grading being done by local inspectors who are licensed by this bureau. Approximately $1,000 is being used on this work at present.

Project Statement

Project	Expended 1929	Estimated 1930	Estimated 1931	Increase
Inspection of fruits and vegetables	$310,532	$307,522	$307,522	-
Ins. of dairy and poultry products	38,623	35,619	40,619	$ 5,000 (1)
Ins. of hay, beans, broomcorn etc.	45,080	54,709	59,709	5,000 (2)
Grading of meats and meat products	16,318	22,150	42,150	20,000 (3)
Grading of tobacco	-	20,000	20,000	-
Inspection of rice	-	-	5,000	5,000 (4)
Total	410,553	440,000	475,000	35,000

BUREAU OF AGRICULTURAL ECONOMICS (Continued)

Activities under this Appropriation

General

This appropriation covers the inspection and grading service on fruits and vegetables, dairy and poultry products, hay, beans, seeds, broomcorn, rice, meats and tobacco. The service is permissive in character, the Federal inspector performing the inspections only at the request of an interested party and issuing certificates which are prima facie evidence in the Courts of the United States as to the quality and condition of the shipment inspected. The service has grown rapidly and is to a large extent self-supporting. Fees collected for the services during the past year and covered into the Treasury as miscellaneous receipts amounted to more than $250,000.00.

Inspection of fruits and vegetables: All previous records were broken during the fiscal year 1929, for the number of inspections of fruits and vegetables, both at shipping points and receiving points. At shipping points there was an increase of 18,367 cars and at receiving points 5,202 cars, with a total of 266,831 inspections, compared with 243,262 for last year. In addition large quantities of products were inspected for the United States Navy, the Marine Corps and other governmental agencies. Practically all of the shipping point inspections are made under cooperative agreements with the various States. A popular service which was begun during the past year was the inspection of growers' loads of cannery tomatoes upon delivery to the factory. Both the growers and the buyers who have tried the system are heartily in favor of trading on the basis of the special United States grades recommended for canning stock. Much educational work on better methods of production and marketing is accomplished through the inspection service.

Dairy and Poultry Products: Butter and Cheese grading services are available in a number of the principal markets and producing districts of the country. During the past year 130,000,000 pounds of butter were graded, compared with 120,000,000 for the previous year. This amount is nearly 10 per cent of the total butter production of the United States. A very large part of the grading work is done by Federal-State employees working under the supervision of the Federal Department.

The egg grading service is growing rapidly in cooperation with State and other agencies, and service on live and dressed poultry is in operation at a limited number of points. An inspection service has been inaugurated in New York City and adjacent points on live poultry in cooperation with the New York Live Poultry Commission Merchants Association. The purpose of this inspection work is to determine if the live poultry received in New York is in a healthful condition and that it has not been over-fed. More than 12,000 cars were inspected in New York. More than 10,000,000 pounds of dressed poultry was inspected for canning at various points.

Hay, Feed and Seed, etc.: Inspection work is increasing rapidly on hay, and beans, and a service has recently been established for soybeans. Seed verification work was carried on for alfalfa seed, certificates being issued during the past year on more than 31,000,000 pounds. The service has been expanded to include clover seed during the current year.

Grading of Meats and Meat Products: More than 23,500,000 pounds of meat were graded during the past year under the regular grading service, and nearly 32,000,000 pounds of beef were graded and stamped with the grade at packing plants. The stamping of the grade with a roller stamp upon the carcass, enables consumers to buy the quality they desire in retail cuts. Producers and dealers organizations are giving hearty support to this service.

Grading of Tobacco: An amount of $20,000 was included in the appropriation Act for the current year for the purpose of inaugurating a grading service on tobacco. Cooperative agreements have already been entered into with a number of tobacco producing States and considerable quantities of tobacco have been graded under Federal supervision. The grading service enables the grower to know the quality of his tobacco before it is sold.

(f) MARKET NEWS SERVICE

Appropriation, 1930	$1,304,260
Budget, 1931	1,375,000
Increase	$ 70,740

The increase of $70,740 is submitted for the following purposes:

(1) $23,000 for expanding the service on livestock and meats, by placing livestock specialists in the Middle West. These men will make contacts with shipping associations, concentration point managers, packers and local buyers to obtain and forward market information. This is necessary in order to report the movements and prices of livestock bought direct from producers. Additional information will be transmitted by radio to points not covered by leased wires and connections will be made at points where local interests will receive and disseminate the market information available from the leased wire circuits.

(2) $24,000 for expansion of the fruit and vegetable market news service. This increase will be used largely in extending the service into producing districts through the operation of temporary stations during short periods when important crops are moving to market. New points will be connected with the system by either leased wire connections or transmission of information by commercial wire to be disseminated by radio stations.

(3) $12,740 for inaugurating a news service on poultry and eggs at Boston and Philadelphia. These are two of the largest egg markets in the country and there have been urgent requests from producers, especially in the far West that the bureau report these markets. The rapid growth of the commercial production of poultry and eggs makes it necessary that producers be kept informed upon market conditions so as to prevent unnecessary fluctuations and losses.

(4) $11,000 for expanding the work of the Hay, Feed and Seed Division by inauguratihg a news service on beans in a limited number of important markets for this crop. Beans is a very important crop for which practically no market information is made available. There is an urgent demand for this service.

Project Statement

Project	Expended, 1929	Estimated, 1930	Estimated, 1931	Increase
Market Reports on Livestock, Meats and Wool	405,939	480,387	503,387	$23,000 (1)
Market News Service on Fruits and Vegetables	433,380	532,370	556,370	24,000 (2)
Market News Service on Dairy and Poultry Products	189,066	196,440	209,180	12,740 (3)
Market News Service on Grain, Hay, Feed and Seed	85,390	95,063	106,063	11,000 (4)
Total	1,113,775	1,304,260	1,375,000	70,740

Activities under this Appropriation

General

The market news service is built upon the leased wire telegraph system. The bureau obtains under contract the exclusive use of certain telegraph wires throughout the day, and employs its own telegraphers who transmit the market information over the wires in code and decode the incoming messages. The market reporters are in the markets, often as early as four o'clock in the morning and report receipts and prices. The information goes over the leased wire to Washington and to all branch officers where it is combined with other reports and released to the public. A constant stream of market information is kept going over the wires and is given publicity throughout the country by telephone, telegraph, radio, mail, bulletin boards, newspapers and otherwise.

The bureau operates 10,549 miles of leased telegraph wires which extend from Washington, D. C. to Baltimore, Philadelphia, New York, and Boston; south to Atlanta, Jacksonville and New Orleans; west to Pittsburgh, Cleveland, Detroit and Cincinnati, Chicago, Minneapolis and St. Paul; St. Louis, Sioux City,

Omaha, Wichita, Kansas City, Denver, Salt Lake City, San Francisco; Portland, Ore., Seattle and Spokane, Washington and Boise, Idaho; and in the southwest to Fort Worth and San Antonio. A number of State offices are connected with the leased wire system and State officials take the information and disseminate it for the benefit of their localities. The leased wire is utilized also to some extent in disseminating information on general economic conditions and special information on crop and market conditions in foreign countries.

Market Reports on Livestock, Meats and Wool: Branch offices are maintained in 24 cities throughout the year, and market conditions and prices are reported at 29 important markets of the country. During the current year a meat reporting service is being inaugurated at San Francisco and the New York City service has been enlarged to include locally dressed meats. Information is compiled and published covering daily livestock prices by 60 classes and grades at 23 markets; daily fresh meat prices by 43 classes and grades at 4 markets; daily cured meat prices by 20 classes and grades at 4 markets; weekly wool prices at Boston; actual daily receipts of livestock at 18 markets, and other data. Summaries and economic reviews are furnished newspapers and farm publications and special reports are prepared for radio stations.

Market News Service on Fruits and Vegetables: Market stations are maintained in 23 cities and approximately 40 temporary stations are operated for varying periods during the movement of important crops. Approximately 15,000,000 mimmeographed market reports are issued in the course of a year, to a mailing list of producers, producers' and shippers' associations, dealers, common carriers, banks, newspaper and other news disseminating agencies.

Complete market information is distributed on 22 of the most important fruits and vegetables. Carload shipment information is obtained from common carriers and published on 38 products. During the past year a total of 1,088,095 cars were reported by the carriers.

The news service has grown steadily in popularity and effort is being made constantly to improve the reports and furnish the type of information most useful. Many special reports and summaries are prepared for daily papers and other publications.

Market news service on Dairy and Poultry Products: This service covers market news on butter, cheese, live and dressed poultry, eggs, turkeys, and milk and cream, in a limited number of markets. A market reporting service for live poultry has recently been inaugurated at Chicago and for milk and cream at Philadelphia. The service has been expanded on the Pacific Coast by opening offices at Los Angeles, Calif. and Portland, Oreg.

Market News Service on Grain, Hay, Feed and Seed: Previous to this year this service was confined to the East and Middle West. New Offices have have now been opened in Portland, Oreg., San Francisco, and Los Angeles

making the service more nearly national in scope. An experimental service has been started on rice for the benefit of the growers in Arkansas, Louisiana, and Texas, which has been favorably received. The seed reporting service and the reports on feeds have continued to be popular.

(g) COOPERATIVE MARKETING

The Division of Cooperative Marketing was transferred by Executive Order to the Federal Farm Board, effective October 1, 1929, consequently no estimate is included for 1931 in this Department.

Appropriation, 1930 ..... $290,000
Budget, 1931 ..... - - -

(h) ESTIMATES OF COTTON GRADE AND STAPLE

Appropriation, 1930 ..... $420,000
Budget, 1931..... 420,000

Project Statement

Project	Expended, 1929	Estimated, 1930	Estimated. 1931
Estimates of Cotton Grade and Staple	$424,037	$420,000	$420,000

Activities under this Appropriation

This act directs the Secretary of Agriculture to collect and publish annually, statistics or estimates covering the grades and staple length of stocks of cotton, known as the "carry-over" on hand on the first day of August of each year in warehouses and other establishments. Following such publication he is directed to publish at intervals estimates of the grade and staple length of cotton of the then current crop, it being provided that not less than three such estimates shall be published with respect to each crop. It is further provided that in any such statistics or estimates published, the cotton which is tenderable under the United States Cotton Futures Act shall be stated separately from that which may be untenderable.

The first report under this Act was made on the grade, staple and tenderability of cotton carried over on August 1, 1928. Similar reports were made each month for the 1928 crop and a final report on April 19, 1929 for the total 1928 crop. A report has been issued on the carry-over as of August 1, 1929 and reports are being issued on the 1929 crop as it is ginned.

The data on which the carry-over estimate was based were obtained by classing a representative portion of the cotton carried over in consuming establishments, public storage and compresses, and on the farms, Estimates of the crop were based on the classification of cotton furnished by gins so selected as to represent approximately 10 per cent of the cotton ginned in the United States.

(i) TOBACCO STOCKS AND STANDARDS

Appropriation, 1930 (balance for 1930 from $30,000 item in second deficiency Act, 1929).....$25,000
Budget, 1931..... 25,000

BUREAU OF AGRICULTURAL ECONOMICS (Continued)

Project Statement

Project	Expended, 1929	Estimated, 1930	Estimated, 1931
Tobacco Stocks and Standards	$4,693	$25,000	$25,000

This is a new item as far as the Agricultural Act is concerned, involving an apparent increase of $25,000, but taking into consideration the fact that the Second Deficiency Act, 1929, provided $30,000 for this purpose for the fiscal years 1929 and 1930, and that of this amount approximately $25,000 remains available for use in 1930, there is no actual increase in funds for 1931 over those available for 1930.

Activities under this Appropriation

Under the provisions of the tobacco stocks and standards act, approved January 14, 1929, the April 1 tobacco-stocks report shows for the first time not only a complete separation according to type, but a separation of new and old crops. Preliminary work has been accomplished in preparation for a further separation of stocks according to groups of grades, which will have the effect of disclosing the quality of tobacco on hand according to its manufacturing utility. Sufficient progress has been made to indicate that reports on this basis can be undertaken in the near future. These reports will make available much more adequate statistics on tobacco than are now available.

(j) ENFORCEMENT OF THE U.S.COTTON FUTURES AND U.S.COTTON STANDARDS ACTS

Appropriation, 1930	$219,500
Budget, 1931	234,500
Increase	$ 15,000

An increase of $15,000 to be used in providing additional copies of the official standards. This increase is made necessary by the continual increase in the distribution of standards brought about by the increased demand for the existing standards, and by the establishment of nine boxes of standards for preparation of American upland cotton 1-1/8 inch staple and longer; also for the reestablishment of the standards of American Egyptian

cotton and extra White standards. From July 1, 1928 to April 30, 1929, a total of 17,000 staple types were issued as compared with 10,762 shipped during the fiscal year 1928, and 5,720 during the fiscal year 1927. It is necessary to purchase additional boxes, trays and cartons to be used as containers for the standards for grade. Additional personnel also will be required in the preparation of these standards.

Project Statement

Project	Expended, 1929	Estimated, 1930	Estimated, 1931	Increase
Administration of the Acts	$ 18,364	$ 22,000	$ 22,000	
Future and Spot Market Investigations and Cotton Price Quotations	52,092	51,980	51,980	
Preparation and Distribution Of Official Cotton Standards	148,521	145,520	160,520	$15,000
Total	218,977	219,500	234,500	15,000

Activities under this Appropriation

Under the Cotton Futures and Cotton Standards Acts, the Department is authorized to promulgate standards for cotton. The Cotton Futures Act provides for the regulation of the cotton future exchanges and for the classification of cotton tendered for delivery on future contracts. Under this act supervision is maintained over designated spot markets, and a cotton price quotation service is maintained. In addition to furnishing authentic information of prices these quotations serve as a basis for the settlement for cotton, other than middling, delivered on future contracts. The Cotton Standards Act makes mandatory the use of the official cotton standards in interstate and foreign commerce, provides for the classification of spot cotton by representatives of the Department, and for licensing of cotton classers. Universal cotton standards have been promulgated under this act and these have been adopted by the principal foreign cotton exchanges.

Copies of the official standards are prepared and sold to the public. No other agency is permitted to prepare these standards. Every two years a conference is held with representatives of the leading cotton associations of Europe at which copies of the Universal Cotton Standards are approved. The next conference will be held in the spring of 1931. All cotton tendered for delivery on future contracts must be classed by representatives of the Department. During the past year 446,181 bales were classed, as compared with 137,695 for the fiscal year 1928. In addition spot cotton is classified upon request under the Cotton Standards Act. Spot cotton markets are supervised in connection with the quotation of differences under the Cotton Futures Act, and Market Information is gathered and disseminated for the benefit of producers and others.

(k) ENFORCEMENT OF THE U.S. GRAIN STANDARDS ACT

Appropriation, 1930	$820,000
Budget, 1931	840,000
Increase	20,000

BUREAU OF AGRICULTURAL ECONOMICS (Continued)

An increase of $20,000 is submitted for the purpose of providing additional personnel to meet the increased demand for the settlement of appeals from the grade assigned by licensed inspectors.

The appeal service has grown so rapidly that it is imperative that additional funds be secured in order to handle this work. The number of appeals handled in the fiscal year 1927 was approximately 60,000; in 1928 80,618 and for 1929 they totalled 84,135. A further increase is expected during the current year. A strong demand has arisen for the appeal certificate in connection with export grain, and for this reason it will be necessary to increase the personnel in charge at Chicago, Duluth, and Milwaukee, which are important lake shipping points, and at the transit port of Buffalo.

Project Statement

Project	Expended, 1929	Estimated, 1930	Estimated, 1931	Increase
Enforcement of the U.S. Grain Standards Act.....	$792,467	$820,000	$840,000	$20,000

Activities under this Appropriation

The grain standards act is essentially a service statute. It became a law in 1916. Under the law this Department is charged with two major responsibilities: (1) the fixing and establishment of official grain standards of the United States for each kind of grain, the use of which is mandatory in case of interstate and foreign commerce transactions, and the enforcement of a correct and uniform application thereof by State, board of trade and private inspectors who are licensed by this Department under definite terms of the law; (2) determination by this Department of the true grade of individual lots of grain and certification thereof, moving in interstate or foreign commerce, upon appeal by any interested party.

The enforcement of the Grain Standards Act requires a large organization to supervise the work of licensed inspectors and to prevent infractions of the law. All grain shipped by grade in interstate commerce must be inspected by a licensed inspector. This results in an enormous number of inspections. The Federal Grain Supervisors work constantly to check up the work of the licensed graders and to bring about thorough understanding and uniform application of the Federal Standards. New grading problems arise constantly which necessitate prompt study, and instruction of the force. Adverse weather conditions, plant diseases, andother circumstances result in various types of out-of-condition grain which must receive special attention.

The Grain Standards Act has become a very important factor in the marketing of grain, and numerous questions have arisen with regard to its enforcement. It seemed desirable, therefore, to have an impartial study made of the operations of the Act; consequently a committee has been appointed for this purpose. This committee is now making a survey of the entire field for the purpose of ascertaining what steps, if any, should be taken to improve the service. It is expected that this committee will report upon its findings in the near future.

BUREAU OF AGRICULTURAL ECONOMICS (Continued)

(1) ADMINSTRATION OF THE U.S. WAREHOUSE ACT

Appropriation, 1930 .....$256,000
Budget, 1931 256,000

Project Statement

Project	Expended, 1929	Estimated, 1930	Estimated, 1931
Administration of the U.S.Warehouse Act.....	$240,548	$256,000	$256,000

Activities under this Appropriation

Under this act the Department inspects warehouses for the storage of certain farm products, and issues licenses to warehousemen who comply with the provisions of the law. A continuous check is kept upon the operations of the licensed warehouses. The main purposes of the Warehouse Act are to safeguard the storage of farm products and to furnish a warehouse receipt which will be acceptable as collateral for loans and thus furnish the farmer with a means of securing credit as an aid to the orderly marketing of his crop.

Products warehoused under this Act are: Grain, cotton, tobacco, wool, canned foods, cold pack fruit, peanuts, broomcorn, potatoes, beans, sirup, and cottonseed.

There has been a continued increase in licensed cotton-storage capacity. On October 1, 1929, this figure reached 3,739,231 bales. Through these licensed warehouses approximately one-half of the total cotton crop is handled. Some of the largest cotton warehouses of the world are under Federal license, among them being the public warehouses at Memphis and New Orleans.

A moderate increase was made during the past year in licensed space for storing grain, the total capacity being approximately 36,681,776 bushels on October 1, 1929. In connection with the grain work a terminal elevator with 1,200,000 bushels capacity was licensed at Omaha, Nebr. A wool warehouse at Columbus, Ohio, having a capacity of about 4,875,000 pounds of wool, was licensed. This warehouse serves the wool-marketing agencies of Ohio, Indiana, and Michigan farm bureaus. Space for warehousing 233,859,000 pounds of tobacco is licensed. The largest tobacco storage in the country is operating under the Federal Warehouse Act. Warehousemen storing canned foods have rendered a real service to their patrons. Without exception, canners who have used the warehouse act have been outspoken in their praise of this service. Space is licensed for warehousing 2,334,400 cases of canned fruit, and 5,500,000 pounds of dried fruit.

The placing of cold-pack fruit on the eligible list for storage under the Warehouse Act has resulted in serving to a high degree the packers of berries in the Northwest, particularly the cooperative associations. Licensed capacity for handling this commodity has more than doubled during the year, amounting to 4,235,000 pounds on October 1.

BUREAU OF AGRICULTURAL ECONOMICS (Continued)

(m) ENFORCEMENT OF THE STANDARD CONTAINER, HAMPER, AND PRODUCE AGENCY ACTS

Appropriation, 1930	$40,000
Budget, 1931	45,000
Increase	5,000

Project Statement

Project	Expended, 1929	Estimated, 1930	Estimated, 1931	Increase
Enforcement of the Standard Container, Hamper and Produce Agency Acts	$35,963	$40,000	$45,000	$5,000

An increase of $5,000 for the employment of additional personnel under the Standard Container, Hamper, and Produce Agency Acts: The exceptional amount of work occasioned by the Standard Hamper Act of 1928 is due to the fact that containers covered by this act must be not only of the proper cubical capacity, but the specifications therefor must have been submitted and approved by the Secretary of Agriculture. The bureau has not been able to keep current with this work and additional assistance is needed in order to give prompt advice and service. The complaints under the Produce Agency Act have increased greatly. These complaints must be taken care of promptly, and they require careful personal investigation.

Activities under this Appropriation

Under the two standard container acts, provision is made for fixing standards for climax baskets for grapes and other small fruits and vegetables; standards for baskets and other containers for small fruits, berries and vegetables; standards for hampers, round stave baskets and splint baskets for fruits and vegetables. The Produce Agency Act provides for the prevention of destruction or dumping without good and sufficient cause, of farm produce received in interstate commerce by commission merchants and others and requires them to account for all farm produce received by them.

There has been a constant increase in the number of cases which justify personal investigation under the Produce Agency Act. As the Act has become better known the number of appeals has steadily increased. In a very large number of cases it has been possible to effect a satisfactory adjustment, only a comparatively small number having been submitted to the Department of Justice for prosecution. It has been demonstrated that there are many real abuses in the fruit and vegetable industry and that a great deal of work remains to be done looking toward their correction. The bureau has been accorded very fine cooperation by the dealers.

BUREAU OF AGRICULTURAL ECONOMICS (Continued)

The Standard Hamper Act of 1928 provides specifications for splint baskets, hampers, straight side, and round stave baskets. The proportion of non-standard containers under this Act has been found to be very much higher than under the Standard Container Act of 1916. The work under this Act has been very heavy. Manufacturers are cooperating with the Department in submitting samples and in revising their specifications to meet legal requirements.

(n) COMPLETION OF THE WOOL WORK

Appropriation, 1930 ..... $8,000
Budget, 1931 8,000

Project Statement

Project	Expended, 1929	Estimated, 1930	Estimated 1931
Completion of the Wool Work (War Industries Board)	$7,023	$8,000	$8,000

Activities under this Appropriation

This work, transferred from the War Industries Board to the Department of Agriculture by Executive Order of December 31, 1918, provides for the collection from dealers and return to growers of excess profits resulting from the sale of the wool clip of 1918. Completion of this work is now awaiting court decisions on a number of cases.

Through audits of the books of dealers it has been ascertained that excess profits of $1,511,759.37 were made on the 1918 season's wool operations. Of this amount $760,702.91 has been collected and most of the remainder is tied up in litigation. An amount of $453,654.24 has been distributed to growers and $249,325.51 has been found to be undistributable since it has not been possible to ascertain the growers to whom it is due.

(o) WOOL MARKETING STUDIES

Appropriation, 1930 .....$ 50,000
Budget, 1931 50,000

Project Statement

Project	Expended, 1929	Estimated, 1930	Estimated 1931
Wool Marketing Studies	$14,148	$50,000	$50,000

Activities under this Appropriation

An amount of $50,000 per annum was authorized under the Act approved May 17, 1928, and this amount is requested in the annual appropriation Act. This Act provides for acquiring and diffusing useful information relative to the standardization, grading, preparation for market, marketing, utilization, transportation, handling, and distribution of wool, and of approved methods and practices relative thereto, including the demonstration and promotion of the uses of grades for wool in accordance with the standards promulgated by the Department of Agriculture.

BUREAU OF AGRICULTURAL ECONOMICS (Continued)

This Act makes available for research and service work on wool the funds collected under the "Completion of the Wool Work (War Industrial Board)" and which remains undistributable in the Treasury because it has been found impossible to ascertain the growers to whom it belongs.

The funds are being used in perfecting the standards for wool and demonstrating their use. Much interest is being shown in the standards by foreign buyers. At the meeting of the International Wool Conference held in Paris in November, 1928, a committee was appointed to report upon the advisability of adopting the standards as a basis for trading. Further conferences must be held with foreign buyers.

An extensive program of wool scouring research work is under way. Hundreds of samples are being submitted by wool interests for laboratory tests and advice from the bureau. The bureau is working toward the determination of a scientific basis for estimating shrinkage of wool. This information is very badly needed by the wool industry. Work is being done on the moisture problem which is very troublesome in handling wool. Wool shipped from an arid section to one of greater humidity gains in weight. Wool that has been scoured absorbs moisture also on standing. The bureau is attempting to devise satisfactory tests for measuring the moisture content and the "regain" of moisture and to work out the relation between the moisture content and the grade of the wool.

(p) OPERATION OF CENTER MARKET

Appropriation, 1930	$150,000
Budget, 1931	--
Decrease	150,000

Project Statement

Project	Expended, 1929	Estimated, 1930	Estimated, 1931	Decrease
Operation of Center Market	$137,236	$150,000	--	$150,000

No appropriation is included for 1931 since the Department has been notified that the site upon which Center Market is located will be needed in carrying out the building program of the government. S. J. Res. 77, providing for the closing of Center Market on or before June 30, 1930, passed the Senate on October 31, 1929.

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Note.- See also Miscellaneous Section for proposed allotment under Special Corn Borer Research.

BUREAU OF HOME ECONOMICS

(a) GENERAL ADMINISTRATIVE EXPENSES

Appropriation, 1930 . . . . . $18,500
Budget, 1931 18,500

Project Statement

Project	Expended 1929	Estimated 1930	Estimated 1931
General administrative expenses	$ 18,257	$ 18,500	$ 18,500

Activities under this appropriation

Salaries and expenses of the general administration of the bureau are paid from this appropriation.

(b) HOME ECONOMICS INVESTIGATIONS

Appropriation, 1930 . . . . . $149,000
Budget, 1931 189,200
Increase 40,200

An apparent increase of $40,200 but an actual increase of $35,000, since $5,200 is transferred from the appropriation for "Marketing and Distributing Investigations", Bureau of Agricultural Economics, which is reduced accordingly. The $5,200 so transferred is being used during the fiscal years 1929 and 1930 on a cooperative project with the Bureau of Agricultural Economics, but the direction of the employees concerned and the supervision of this part of the work is all handled by the Bureau of Home Economics, in view of which it is proposed to transfer this item from the Bureau of Agricultural Economics to the Bureau of Home Economics.

The major portion of this fund has been used in investigation of the wear of cotton fabrics produced from cottons of known grade and source. It will be necessary to continue these studies over several years in order to build up information as to the uses best suited for the different grades now in the market and the influence of grade on quality and wear of the fabric made from it. Studies have also been made of physical properties of some of the cotton fabrics now on the market, especially as regards their suitability under different climatic conditions. The findings are being used as the basis for recommendations for the best use of these fabrics and to develop designs for garments in which they may be used satisfactorily.

The actual increase of $35,000 is submitted for the following purposes:

(1) $15,000 for use in studies of vitamin content of human foods. It is essential that the vitamin content of foods be known if dietary standards

are to be adequately determined and applied. At the present time our knowledge of the vitamin content of human foods is very inadequate since the majority of studies of this field have had to do with animal feeding and deal with foods not used in human dietary. In many sections of the country the diet is deficient and can not be improved satisfactorily until more is known about the vitamin content of the foods available in those localities. For instance the pellagra situation in the South is largely a question of unsatisfactory diet. Studies need to be undertaken to show which of the foods locally grown can be used in the prevention of this disease which is causing much economic loss in the South. Furthermore, it is exceedingly important for the housewife to know the effect of various household and commercial methods of handling on the vitamin content of the foods she is using. Foods are increasingly being sold on the basis of vitamin content. Marketing organizations are coming for information as to the vitamin content of these products and methods of handling so as not to impare the vitamin content before it reaches the home. With our limited staff, it has been impossible to study even those foods which certain marketing conditions have made specially important. The amount asked for would expedite the outlet from this laboratory. The increase is asked in order to make possible vitamin studies for grape products, ripe olives, dates and figs which have been specifically requested by the organizations concerned, and to enable us to supply the home demonstration workers in the Southern States with data in regard to the foods which can be used to decrease pellagra.

(2) <u>$10,000 for use in the study of utilization of food products</u>. This increase is asked for in order to enable us in the study of best methods of utilizing various agricultural products. It is necessary to know the most desirable varieties of certain basic food stuffs if they are to be marketed to advantage. The final test of use is determined in the home. Certain food products of high food value now being discarded in processing can, with some modification, be utilized to advantage as food. For example, this bureau has been studying for the past two years rice polish and wheat germ. These products of high food value can be satisfactorily preserved and utilized in the home to safeguard diets which would otherwise be inadequate. The bureau has worked in cooperation with the Bureau of Plant Industry and the Bureau of Chemistry on these products. When satisfactory methods are worked out and the housewife educated in their use much can be done to settle the white flour-whole wheat controversy, since we can add to white flour, by a small addition of wheat germ, the vitamins and minerals likely to be lacking in white flour. The miller can then put white flour on the market and sell whole wheat germ separate and meet the partially true statement made by salesmen of whole wheat products. If the surplus fresh fruits which are so highly perishable are to be used to advantage in distant home markets and spread over along the season, new methods of preservation must be found and ways of using products so preserved. For example, the cold pack fruits can be preserved quickly and found industrial outlets if home markets could be found for these. The home economist must advise as to the form of preservation which will be best adapted to home use. These

studies all take into consideration the food value and vitamin content of foods and any influence of the methods of processing and preparation on these. The aim is to develop methods of preparation and use of foods which will develop more economic utilization and distribution.

(3) $10,000 for study of food purchasing habits of housewives. Part of the difference between what the farmer gets for the food he raises and what the consumer pays for it is due to the way in which the housewife does her buying at the retail store. By purchasing only a few foods at a time and only small quantities of each, she increases the work of the sales clerks, bookkeepers and delivery force in providing her with her week's supply of food, and so adds to the costs of retailing. By choosing foods in small and fancy containers instead of in large and plain ones or in bulk, she adds to the costs of manufacturing. By using foods of the finest form for dishes in which the appearance of the food does not matter, such as fruit of perfect shape for pies, or whole nut meats for chopped nuts, she reduces the proportion of the crop which can be marketed to advantage and increases the price of that part which is sold.

No attempt has yet been made to alter these purchasing habits of the housewife, but there is no reason for assuming that they can not be altered. Information should be secured as to the quantities in which the different foodstuffs can most efficiently be bought by different types of families, based upon the amount of the food consumed during the year, its keeping qualities and the storage space required. The form and quality of each food which is best suited to the families' needs and most economical should also be determined. This information should be used as a basis for educating the housewife in food purchasing, and should serve as a guide to the producer and retailer in placing their products before the consumer.

Project Statement

Project	Expended 1929	Estimated 1930	Estimated 1931	Increase
Foods and nutrition	$ 50,000	$ 62,398	$ 87,398	$25,000(1)(2)
Economic studies	35,501	37,078	47,078	10,000 (3)
Textiles and clothing	30,487	33,384	38,584	5,200 (*)
Dietary studies	13,309	16,140	16,140	-
Total	129,297	149,000	189,200	40,200

(*) Apparent increase, transferred from Bureau of Agricultural Economics.

BUREAU OF HOME ECONOMICS (Continued)

Activities under this Appropriation

General

The research work of the Department in home economics is conducted under this appropriation. No field stations are maintained, the work all being done in Washington. The results of the researches are printed in technical bulletins and journals and furnish the basis for the more popular farmers' bulletins and circulars. The field of these studies as indicated by the Appropriation Act is to "enable the Secretary of Agriculture to investigate the relative utility and economy of agricultural products for food, clothing, and other uses in the home with special suggestions of plans and methods for the more effective utilization of such products for these purposes, and to disseminate useful information on this subject." The existing program of work deals with the most pressing problems that can be handled within the limits of the available appropriation. These studies are set up under the main divisions, Foods and Nutrition, Economic Studies, Textiles and Clothing, and Dietary Studies, as follows:

Foods and Nutrition: Summaries of existing information on food composition and facts of nutrition are prepared and laboratory investigations are made to supplement these and make possible the application of scientific facts of nutrition to everyday living. The economic value of the agencies concerned in food production, manufacture and distribution, as well as the close relation of food to health, emphasizes the importance of a food production and distribution program based on requirements of good nutrition. These studies have been planned with the idea of helping to show wise use of agricultural products for food in the home and to contribute toward more orderly marketing and wise use of same. The allotment of funds under this project is approximately as follows:

Lines of Work

	Expended 1929	Estimated 1930	Estimated 1931	Increase
Vitamin studies	$20,000	$ 20,000	$ 35,000	$15,000
Food utilization	20,000	22,398	32,398	10,000
Food composition.	10,000	20,000	20,000	-
Total	50,000	62,398	87,398	25,000

Special Lines of Work on Foods and Nutrition

Collection and publication of data on food composition. It is the only Government agency concerned with this work. The data so collected are being used by food agencies, nutritionists, and advertisers as well as research workers the country over and abroad. Our publication on this subject is the standard one for American food materials and the data being collected cover all groups of foods.

BUREAU OF HOME ECONOMICS (Continued)

Studies of the vitamin content of food and summary of results from other laboratories so as to bring together all available information. Our own studies on vitamin content have been concerned first with method in helping establish standard methods for testing, and second, testing foods referred to us by other bureaus and cooperative organizations in order that they may have information in the marketing of their products, and that dietitians may use wider selection of food in recommending vitamin-containing diets.

During the past year studies of vitamin content of green tea, rice polish, wheat germ, varieties of spinach and watermelon have been made and studies of ripe olives, watermelons, grapes and grape products are being planned.

Food utilization studies, including, first, studies on palatability of products produced under various conditions; second, methods of preparation for most satisfactory use of both new and old products referred to us for study by cooperative organizations, third, dissemination of recipes in circulars and over the radio to help the housewife in wise utilization of food products of various kinds.

The most extended study of palatability has been on varieties of meats, though similar studies on potatoes and rice are now started. The cooking tests have covered a wide range of foodstuffs.

Economic Studies: Under this project studies are conducted of expenditure of time and money in the home to help the housewife in setting up household budgets and time schedules which will meet the different needs and balance the various household demands. There is a demand for household budgets set up in objective terms showing the content of family living and expenditures for same against which detailed cost-of-living accounts and results can be checked, and as a basis for preparing household budgets for various purposes. In the same way time records must be had as a basis for household labor studies. To this end the Economics Division has concerned itself chiefly with two sets of problems.

In cooperation with various groups, cost-of-living records have been collected and the data analyzed in detail to see the extent to which the materials being purchased are meeting the needs of the family. This is the only Government agency which has been in a position to analyze data on content of living and check them against definite standards. Some time has been spent in determination of the most satisfactory methods of collecting such data, the results of which have been made available to the State organizations and other Government agencies interested in this problem. There has not only been a detailed analysis of food expenditure as indicated above, but also clothing expenditures for farm families. In connection with these studies an analysis of the trends in cotton consumption was a definite help to the industry in planning the cotton production program so as to use up surplus supplies.

BUREAU OF HOME ECONOMICS (Continued)

The household production or use-of-time studies were initiated by the collection of data on how the housewife is spending her time. This material is being analyzed and preliminary reports published. As the result of this, suggested time schedules are being prepared and suggestions made of various ways by which the household labor program may be simplified.

Textiles and Clothing: Under this project studies are made of the relative values of different fibers and different qualities of the same fiber for various uses in the home. Studies are under way now to show the influence of different types and qualities of fibers on the properties of the finished fabrics. Staple materials, such as sheeting and blankets woven of known kinds and grades of cotton and wool are being subjected to ordinary conditions of wear and laundering. The physical and chemical changes which take place in both fiber and fabric are being determined throughout the life of the fabric in order that fabrics made from different varieties and grades of fiber may be evaluated in terms of actual usage.

These studies take into consideration the many kinds of processing and finishing to which a fabric may be subjected in modern methods of manufacture, as well as the cleaning and wear it must withstand while in use.

Cotton and woolen materials proposed for outer garments and under garments are being investigated from the standpoint of heat conductivity, air permeability and moisture absorption and their effect on the skin temperature of persons wearing them.

Due to the importance of the care of clothing and household fabrics in the home, the division has given particular attention to this aspect of the utilization of textile fibers. Investigations on problems of stain removal, laundering and sizing of textile fabrics have been initiated and will be extended as rapidly as possible. Studies are just being started on the influence of heat and pressure in ironing on appearance and wear of household fabrics.

The section on clothing design is engaged in developing new designs for clothing and household textiles that will suggest better and more extended use of fibers of importance in the agricultural program. This has involved not only the development of new designs but the making of garments from these designs and their study under average conditions of wear. Since most of these studies have been made on childrens clothing, nursery schools and other institutions have been utilized as laboratories. Cooperation has been effected with pattern producers and manufacturers of children's clothing so as to get these on the market.

BUREAU OF HOME ECONOMICS (Continued)

Allotments under this project are as follows:

	Lines of Work			
	Expended 1929	Estimated 1930	Estimated 1931	Increase
Clothing Design	$20,487	$ 17,384	$ 17,384	-
Utilization of Cotton . . .	10,000	10,000	15,200	$5,200 (apparent)
Utilization of Wool	-	6,000	6,000	-
Total	30,487	33,384	38,584	5,200 (apparent)

Dietary studies: The dietary studies are concerned with the collection of data on foods used by institutions, families, and individuals, these data being analyzed both from the point of view of cost and content, to determine, first of all, what groups are being adequately fed, in the second place the cost of such feeding and in certain cases how it may be reduced, so as to make recommendations as to: first, production based upon nutritive value and consumer demand; and, second, food selection by the housewife so as to provide the family with their nutritive requirements at lowest possible cost.

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PLANT QUARANTINE AND CONTROL ADMINISTRATION

(a) GENERAL ADMINISTRATIVE EXPENSES

Appropriation, 1930 . . . . . .$73,000
Budget, 1931 73,000

Project Statement

Project	Expended 1929	Estimated 1930	Estimated 1931
General Administration	$105,585	$73,000	$73,000

Activities Under this Appropriation

Includes salaries and expenses of general administrative staff.

(b) ENFORCEMENT OF FOREIGN PLANT QUARANTINES

Appropriation, 1930 . . . . . .$550,000
Budget, 1931 700,000
Increase $150,000

The increase of $150,000 in this item is urgently needed to strengthen the service responsible for preventing the entry of new or little known insect pests or plant diseases and the further entry of pests which now have a limited distribution in the United States. To protect agricultural and related industries in this country from the introduction of injurious pests, it is imperative that this service be expanded. The increase will be used for the following purposes:

(1) $5,000 to employ a well-trained Senior Pathologist to act as technical advisor to the Administration on problems pertaining to plant diseases in connection with the entry of foreign plants and plant products, and to assist in making special investigations at ports of entry of foreign plants and plant products to determine freedom from injurious plant diseases.

(2) $54,000 for the inspection service at maritime ports. These funds will be used to enlarge the inspection service at maritime ports of entry where such service is now maintained and to place plant quarantine inspectors at four ports at which there are now no inspectors. It is impossible with the force now available to adequately examine all shipments of plants and plant products requiring inspection as a condition of entry. To avoid delay and resulting losses of perishable products, inspection is often hasty and of a cursory nature, represented by sample examination. This type of examination does not offer sufficient safeguard. It has revealed the presence of numerous pests new to or already established in limited areas in this country, including several species of fruit flies, potato weevils, brown-tail and gipsy moths, citrus canker, etc., and has demonstrated that attempts are being made to enter, under false representation, plants and plant products which have been excluded for pest reasons.

(3) $70,000 for the inspection service along the Mexican Border. There are a number of ports on the border at which there is no plant quarantine pro-

tection, and at a number of ports where inspectors are stationed the force is inadequate to keep inspectors on duty the full period the port is open to traffic. The volume of traffic at certain points where inspectors are now stationed has increased to such an extent that the number of inspectors is insufficient to make necessary inspections of passengers' baggage and vehicles entering from Mexico. Even with the insufficient force now available, a large amount of prohibited plants and plant products is intercepted. Many of the contraband articles have been infested with injurious insects, indicating conclusively the urgent need of having a sufficient force to keep at least one inspector on duty at each port the entire time it is open to the public. Among the interceptions were such dangerous pests as the Mexican fruit worm and the pink bollworm. Infested fruit brought from the interior of Mexico has been found on sale in markets in six Mexican towns opposite American ports of entry. The recent recurrence of the fruit worm in the lower Rio Grande Valley of Texas may have been occasioned by the illegal entry of infested fruit obtained in Mexican markets.

The establishment of three airports on the Mexican border has increased the pest risk as well as the volume of work to be performed at the ports concerned. The brief period that this work has been conducted has demonstrated that prohibited material is constantly arriving, and recently the pink bollworm was found in cotton samples arriving at Brownsville from the interior of Mexico.

(4) $15,000 for the field inspection of plants imported under special permit. Provision is made under the Act for the entry into the United States, under special permits and under adequate safeguards, of limited quantities of any of the restricted plants for the purpose of keeping the country supplied with new varieties and necessary propagating stock or for any experimental, educational, or scientific purpose. Within the last few years many millions of plants of foreign origin have been certified for entry for such purposes. These plants are being grown throughout the United States, under special agreement with the Department. It is necessary to inspect these plants to determine: (a) Freedom from important pests, particularly plant diseases, which may have escaped detection at the initial inspection in Washington or San Francisco prior to shipment to the field; (b) whether the permittees are carrying out their agreement as to propagation; and (c) the rapidity of propagation and the probable date that the plants will be available in this country in sufficient quantities to make it unnecessary to continue to accept the pest risk which accompanies importations of the kind of plants involved. In order efficiently and economically to perform the large amount of inspection work necessary, it is proposed to divide the country into three districts, assigning an inspector to each district and thereby reduce travel expenses.

(5) $6,000 for inspection prior to shipment to the mainland of fruits and vegetables grown in Hawaii. The need for this inspection of fruits and vegetables is occasioned by the presence in Hawaii of the Mediterranean fruit fly and the melon fly which attack these products. The number of inspectors available is insufficient to carry on the inspection necessary to safeguard the movement to the mainland of such commercial shipments of Hawaiian fruits and vegetables. Moreover, at present it is impossible to safeguard, in cooperation with the Post

Office Department, parcel post packages which may contain infested fruit. Two inspectors will therefore be employed; one to assist in the inspection and certification of commercial shipments of fruits and vegetables, and the other to cooperate with the postal officials in intercepting at the source parcel post packages containing fruits and vegetables which may be the means of establishing the Mediterranean fruit fly and melon fly on the mainland.

Project Statement

Project	Expended 1929	Estimated 1930	Estimated 1931	Increase
Import and Permit Service	$61,514	$66,590	$71,590	$5,000 (1)
Port Inspection Service	222,800	227,960	281,960	54,000 (2)
Mexican Border Inspection Service .	158,889	181,255	251,255	70,000 (3)
D. C. Inspection Service	32,019	34,090	34,090	-- ---
Field Inspection Service	9,783	6,205	21,205	15,000 (4)
Hawaiian Inspection Service	12,130	12,600	18,600	6,000 (5)
Porto Rican Inspection Service . .	16,400	21,300	21,300	-- ---
Total	$513,535	$550,000	$700,000	$150,000

Activities under This Appropriation

The work done under this item is to prevent the entry into the United States of injurious insects, plant diseases, and other pests by controlling and safeguarding the entry of plants and plant products, and involves the enforcement of (1) twenty-three foreign quarantines and regulatory orders issued under the Plant Quarantine Act of August 20, 1912; (2) Rules and Regulations Governing the Entry into the United States of Railway Cars and Other Vehicles, etc., from Mexico; (3) the Act of 1905 governing the importation of living insects into the United States; and (4) Regulations Governing the Shipments of Fruits and Vegetables to the Mainland from Hawaii and Porto Rico.

The activities are divided into the following seven projects:

Import and Permit Service: Controlling and limiting the entry of plants and plant products to those which represent the least pest risk, or those which may be adequately safeguarded, involving (a) consideration of applications for permits to import these materials under existing quarantines and regulatory orders; (b) prescribing the ports at which entry may be made; and (c) the special treatment, if any, to be given.

Port Inspection Service: The enforcement, in cooperation with the Treasury Department, at maritime ports of entry of foreign plant quarantines and regulatory orders. Provides for the inspection of passengers' baggage, crews' quarters, and ships' stores for contraband plants and plant products. For the inspection and, if necessary, treatment at port of first arrival or entry of commercial shipments of foreign plants and plant products imported under permit. The inspection, in cooperation with the Post Office Department, of foreign parcel post packages.

PLANT QUARANTINE AND CONTROL ADMINISTRATION (Continued)

Mexican Border Inspection Service: The enforcement, in cooperation with the Treasury Department, at ports along the Mexican Border, of foreign plant quarantines governing the entry into the United States of plants and plant products. The enforcement of rules and regulations governing the entry into the United States of railway cars and other vehicles from Mexico. The examination, in cooperation with the Post Office Department, of parcel post packages entering the United States to determine freedom from contraband plants and plant products. This work involves the inspection and fumigation of railway cars; the fumigation of cotton lint originating in the Juarez Valley; the examination of passengers' baggage, express, freight, and vehicles entering from Mexico. A fee of $4 is collected for each car fumigated and turned in to the Treasury as miscellaneous receipts. The work at these ports has a particular bearing on preventing the entry of the pink bollworm and the Mexican fruit worm.

District of Columbia Inspection: Inspection, certification, and, if necessary, treatment of (1) plants imported under special permit (Washington is the port of entry for practically 90% of all such importations); (2) plants imported and distributed by the United States Department of Agriculture; (3) shipments of domestic plants entering and leaving the District of Columbia; and (4) plants distributed from field stations maintained by the United States Department of Agriculture in the several States.

Field Inspection of Special Permit Material: Inspection in the field of plants imported under special permit. Such inspections are to determine whether any pests (insects or plant diseases) not recognizable at the time of entry and initial inspection have subsequently developed; and to determine if the permittee is utilizing the plants for the purpose for which their entry was authorized.

Hawaiian Inspection Service: Inspection and certification, under Federal quarantine on account of fruit flies, of fruits and vegetables for shipment into the continental United States.

Porto Rican Inspection Service: Inspection and certification in Porto Rico of fruits and vegetables offered for shipment, in accordance with the fruit and vegetable quarantine of Porto Rico, to points within the continental United States. The inspection of foreign plants and plant products entering Porto Rico under permit. The inspection, in cooperation with the Treasury Department, of passengers' baggage, ships' stores, and crews' quarters for contraband plants and plant products.

(c) TRANSIT INSPECTION SERVICE

"For the inspection in transit or otherwise of articles quarantined under the Act of August 20, 1912, as amended, and for the interception and disposition of materials transported interstate in violations of quarantines promulgated thereunder, $40,000."

Appropriation, 1930		-- ---
Budget, 1931		$40,000
The $40,000 submitted is made up of:		
Transfer from the item Preventing Spread of White Pine Blister Rust, which is reduced accordingly.	$17,000	
Transfer from the item Preventing Spread of Phony Peach Disease, which is reduced accordingly.	3,000	
Actual new money requested.	20,000	

This is a new item, involving an actual increase of $20,000. The purpose of this item is to establish a second line of defense in the enforcement of domestic plant quarantines. The development of such a detective system will give much better protection to the agricultural communities outside of areas now under quarantine. The separate enforcement of domestic quarantines at the border of infested areas is insufficient to prevent the movement of restricted and possibly infested articles into outside localities. The road stations maintained in connection with the enforcement of these quarantines do not prevent the movement to points outside of the regulated area of plant material by railroads and no attempt has been made to station inspectors at each shipping point within the regulated area. The inspection made at points within quarantined areas is largely at the request of the shipper and to certify products for movement. The inspection of material in transit will prevent those products which are moved in violation of the quarantine from reaching points more remote from the area in which the pests are known to occur. A large proportion of the plant material which moves interstate passes through transfer points where such shipments are sorted and routed to destination. By cooperating with the railroad, express, and post office officials and placing trained inspectors at strategic distribution centers, it will be possible to examine such material while in transit and detect shipments made in violation of the quarantines.

The work done in connection with the enforcement of quarantines on account of white pine blister rust and phony peach disease has involved the inspection of plant material in transit. In establishing this new item, it is proposed to transfer to it approximately those funds under these two appropriations used for the inspection of material in transit and reduce these appropriations by the amount of the transfer. Such transfer will bring together related work and permit more efficient direction. The inspection of plant material in transit must be performed by men familiar with traffic routings and does not replace other types of inspection.

Project Statement

Project	Expended, 1929	Estimated, 1930	Estimated, 1931
Transit Inspection Service	.....	.....	$40,000

PLANT QUARANTINE AND CONTROL ADMINISTRATION (Continued)

(d) PREVENTING SPREAD OF PINK BOLLWORM OF COTTON

Appropriation, 1930:	
Facial	[illegible]
Amount reappropriated from the unexpended balance of the appropriation of $5,000,000 for the establishment and enforcement of noncotton zones carried in the Second Deficiency Act, 1928	$397,120
Unexpended balance of funds appropriated by Public Resolution No. 12, 70th Congress, and reappropriated for use in 1930	79,800
Amount included in the regular act making appropriations to the Department for the fiscal year 1929 reappropriated for 1930	75,200
Total available 1930	$552,120
Budget, 1931	497,000
Actual decrease	$ 55,120
(Apparent increase	$497,000)

The amount included in the Budget for the fiscal year 1931 provides for carrying on during that fiscal year the scouting and quarantine enforcement work in the same manner as this work has been conducted during the fiscal year 1930.

Change in Language

The language in this paragraph has been amended by striking out the following phrases which reappropriated unexpended balances: "The unexpended balance of funds available for the fiscal year 1929 is continued available for the fiscal year 1930, together with $397,120 of the unexpended balance of the appropriation of $5,000,000 for establishing the enforcing noncotton zones, carried in the Second Deficiency Act, fiscal year 1928."

Project Statement

Project	Expended 1929	Estimated 1930	Estimated 1931	Decrease
Preventing Spread of Pink Bollworm	$403,700	$552,120	$497,120	$55,120

Activities under this Appropriation

This item provides for the enforcement of the quarantine on account of the pink bollworm and for control and eradication work in Texas, New Mexico, Arizona, and elsewhere. Quarantine enforcement includes (1) supervision of fumigation and compression, and certification of cotton, cotton lint, and cottonseed as a condition of movement out of regulated areas; (2) the maintenance of road stations on highways leading out of regulated areas, to prevent the movement of contraband material, and (3) the supervision of the seed disinfection requirement of all gins in the quarantined area. This item also provides for all control and cleanup operations in connection with eradication efforts. Such work includes initially, as to new areas, field cleanup of seed and other cotton waste at all gins and mills within the area; disinfection of seed in farmers' hands or at gins or other points within the area, and the following up and cleanup of all oil mills and other premises which may have received seed from infested areas. It also provides for the necessary scouting to determine possible spread and also any new outbreaks of the pest within the United States or in Mexico near the border.

PLANT QUARANTINE AND CONTROL ADMINISTRATION (Continued)

(e) PREVENTING SPREAD OF DATE SCALE

Appropriation 1930, Facial	$86,700
Less amount expended during 1929 under the provision making $35,000 immediately available	8,000
Total available, 1930	$78,700
Budget, 1931	65,000
Actual decrease	$13,700
(Apparent decrease	21,700)

The information at present available indicates that the necessary eradication work on this pest can, for the fiscal year 1931, be conducted for the amount of the Budget estimate.

Change of Language

The language in this paragraph has been amended by striking out the clause requiring cooperation by the States of Arizona and California and also removing the phrase which made funds immediately available. The two cooperating States have made appropriations for the biennium 1930-31 providing funds as required by the act making appropriations for the fiscal year 1930. In removing the phrase requiring cooperation by the States it is not intended that cooperation will be discontinued. In making the appropriations for the biennial period the States have provided for its continuation during the fiscal year 1931. Inasmuch as the appropriations made by these cooperating States are available for a biennial period and may--should occasion necessitate--be expended without regard of the fiscal years, it is not desirable that a definite and thereby limited amount be written into the act making appropriations for 1931. It is believed that none of the funds included in this amount will be needed during the fiscal year 1930 and the immediately available provision is omitted.

Project Statement

Project	Expended 1929	Estimated 1930	Estimated 1931	Decrease
Preventing Spread of Date Scale	$36,950	$ 78,700	$ 65,000	$ 13,700

Activities under this Appropriation.

The work under this item is to eradicate the date palm scale and to prevent its spread by the enforcement of quarantine regulations. The eradication work involves scouting to locate infested trees and elimination of the infestation by burning, torching, pruning or other approved methods. The Parlatoria date scale is known to occur in limited areas in California and Arizona and is the most serious pest to date palms.

With the aid of the additional funds available during the last year it is believed that the situation regarding this pest has been disclosed. The States in interest and the growers are whole-heartedly cooperating in

this eradication effort. In order that the eradication can be more easily effected, a considerable number of seedlings of no commercial value were destroyed with the cooperation of the owners. During the summer of 1929 a heavily infested seedling jungle was found. In addition to this three rather heavily infested blocks of palms were discovered in the vicinity of Indio. Other than these unanticipated discoveries, no unusual points of infestation were located. A continuation of intensive inspections and the elimination of all incipient infestations will, it is believed, make it possible to eradicate this scale and thus remove the most important limiting factor in the development of dates on lands best adapted for their commercial production.

(f) PREVENTING SPREAD OF THURBERIA WEEVIL

Appropriation, 1930 . . . . . .$34,300
Budget, 1931 34,300

Project Statement

Project	Expended 1929	Estimated 1930	Estimated 1931
Preventing Spread of Thurberia Weevil	$ 32,860	$ 34,300	$ 34,300

Activities under this Appropriation

The work done under this item is to prevent the spread of the Thurberia weevil. This insect is a native variety of the Mexican cotton boll weevil and occurs in portions of the State of Arizona. It is habituated to arid conditions and has demonstrated its capacity to breed in cultivated cotton. It is, therefore, a serious menace to all cotton grown in the semi-arid areas of the United States from Central Texas to California. This item provides for the enforcement of the quarantine on account of this insect, including the control of movement out of the quarantined area of cotton lint, linters, gin waste, and all other forms of cotton, cotton samples, or of cotton plants or portions thereof.

Generally speaking, the situation concerning the Thurberia weevil is very much the same as in previous years. During the crop season of 1928 there was a distinct increase in the abundance of the weevil in the Santa Cruz valley south of Tucson. There is apparently no noticeable increase in the areas north of Tucson and in the San Simeon and Wilcox sections.

PLANT QUARANTINE AND CONTROL ADMINISTRATION (Continued)

(g) PREVENTING SPREAD OF GIPSY AND BROWN-TAIL MOTHS

Appropriation, 1930	$567,500
Budget, 1931	647,500
Increase	$ 80,000

The Increase of $80,000 is for Scouting and Cleanup Operations within the Barrier Zone.- The discovery, during the early autumn, of an unusual number of infestations within this area, the need of expanding the scouting and providing for necessary cleanup and control work requires the expenditure of funds, in addition to those provided in the act making appropriations to the Department for the fiscal year 1930. To meet this unusual situation, it is anticipated that a supplemental estimate of $100,000 will be submitted for 1930.

Situation Regarding the Moth in New England.- The last few years the gipsy moth has increased in abundance throughout the New England area. In the summer season of 1928 it defoliated 262,514 acres of woodland. During the summer of 1929 it caused defoliation over 551,133 acres of woodland--an area more than twice as large as that defoliated in 1928. The defoliation in the season of 1928 was so heavy in parts of Vermont, Massachusetts and Connecticut that it was necessary to extend westward that part of the regulated area considered to be generally infested. In one place this westward extension of the generally infested area touches the eastern border of the Barrier Zone. During the season of 1929 heavy defoliation occurred in substantially the same area as during 1928 and the area over which defoliation occurred was extended in the west central portion of New Hampshire, in Grafton County, and in the central portion of Massachusetts along the Connecticut River.

(1) Work in the Barrier Zone.- The distinct increase of abundance of moth in the area immediately east of the Barrier Zone is of particular significance since the heavy infestation in the territory between the Connecticut River and the eastern border of the Barrier Zone will make it more difficult to keep the protective area free from infestation. The danger of reinfestation from the area east of the zone makes it necessary to carry on, during the fiscal year 1931, intensive inspections in those parts of the Barrier Zone most likely to become infested. The funds available do not permit carrying on intensive scouting throughout the zone each year. In 1931 intensive inspections should be made in areas not so examined in 1930 and all suspicious areas should be reinspected. In addition to this intensive work, general scouting should be done over a large part of the area. If this protective strip is to continue to prevent the spread of this pest into the forested regions to the west, it is imperative that all colonies and incipient infestations be promptly located and exterminated.

(2) Work in New Jersey. - The campaign to exterminate the gipsy moth in New Jersey is progressing satisfactorily and it is anticipated that during the coming season some additional territory can be released from quarantine requirements. The work in this State must be continued but the amount of funds required during the fiscal year 1931 will be $40,000 less than that which is estimated will be expended during the fiscal year 1930. The cost of the operations in this State is divided equally between the State and Federal

Governments and the reduction in the work for 1931 will make it possible to reduce the amount of Federal funds expended in this State by $20,000. The amount thus released will be used for the necessary cleanup and control work within the Barrier Zone.

Project Statement

Project	Expended 1929	Estimated 1930	Estimated 1931	Increase or Decrease
Quarantine and Inspection	$104,585	$110,000	$110,000	-
Scouting and Extermination in the Barrier Zone	418,495	397,500	497,500	+$100,000(1)
Extermination in New Jersey	90,000	60,000	40,000	- 20,000(2)
Total	$613,080	$567,500	$647,500	+$ 80,000

Activities under this Appropriation

The work done under this item is:

(1) To exterminate the gipsy moth in the present restricted area in the State of New Jersey; (2) to maintain a barrier zone throughout which an effort will be made to locate and exterminate all colonies as a means of preventing the westward spread of this pest--such zone comprising a strip of territory 20 to 30 miles wide along the western border of the New England States and the eastern border of New York from Long Island to Canada; and (3) to enforce quarantine restrictions on the movement of nursery stock, stone, quarry, and other products which otherwise might be the means of movement out of the regulated area of the gipsy moth, the brown-tail moth, and the satin moth.

Under the present program the cleanup and control work in the generally infested area is done by the State and local communities. The only regulatory work the Department is doing in this area has to do with the enforcement of the quarantine. The work in the Barrier Zone is done cooperatively with the State of New York. The Federal funds are used in that portion of the zone lying within the New England States.

(h) PREVENTING SPREAD OF EUROPEAN CORN BORER

Appropriation, 1930:	
Facial	$898,000
Amount reapportioned from unexpended balance of the $10,000,000 appropriated by joint resolution making appropriations for the eradication and control of The European corn borer.	50,000
Total available, 1930	$948,000
Budget, 1931	1,000,000
Actual Increase	$ 52,000
(Apparent Increase	$ 102,000)

The increase of $52,000 is needed (1) to establish additional quarantine posts in the New England area and thus prevent the artificial spread of the two-generation form into truck and sweet corn producing regions along the Atlantic Seaboard to which this pest represents a menace; (2) to conduct neces-

sary scouting to determine the presence of the borer in points outside of the area known to be infested; and (3) to carry on, in accordance with understandings with the States, cleanup and control work at isolated infested points.

The scouting performed during the summer of 1929 disclosed infestations of the corn borer in 337 townships outside of the regulated area. The one-generation form which occurs in the western area was found in a number of additional townships in northeastern Indiana, southern Ohio, in a few townships of Northern West Virginia, in three new townships in central Pennsylvania, and in some new localities in the western part of the New England States. In addition to the discovery of occurrence in these new areas adjacent to territory previously known to be infested, the one-generation form has been found in isolated points in Kentucky, New Jersey, and Ohio. Generally speaking, the one-generation form of the borer has been found in approximately the same amount of new territory as last year. There has been a slight increase in the average abundance of the borer throughout the area and a somewhat greater average increase in a few counties near the lakes; but even here, except in isolated spots, no commercial damage has been done.

The two-generation form, which is confined largely to the eastern portion of the New England area, was discovered in additional territory in Maine, New Hampshire, Massachusetts, and Connecticut. The new territory in which this form of the borer has been found is, with the exception of the area in Maine, substantially of the same extent as the spread of last year. Along the southern coast of Maine the infestation has extended eastward to include practically all of two new counties. As a result of cleanup work done in certain areas where this form of the borer was most abundant last year, such as Bristol County, Rhode Island, the average number of the borers has decreased. In certain other limited areas it has become more abundant and caused noticeable damage to certain truck crops.

Change in Language

The language in this item has been amended by striking out the following phrase providing for reapportioning unexpended balances and making funds immediately available:

"Provided, That in addition thereto there shall be immediately available for this purpose $50,000 of the $10,000,000 appropriated by joint resolution making an appropriation for the eradication or control of the European corn borer, approved February 23, 1927 (U. S. C., Supp. 1, p. 22, Sec. 146.)"

Project Statement

Project	Expended 1929	Estimated 1930	Estimated 1931	Increase
Preventing spread of European Corn Borer	$884,630	$948,000	$1,000,000	$ 52,000

Activities under this Appropriation

The work done under this item is to retard the spread of the European corn borer and enforce quarantines against this pest, and, in cooperation with the States concerned, to conduct cleanup operations in isolated infested areas in order to prevent further long-distance spread of this insect. The enforcement of quarantine restrictions is done both within and at the margin of the quarantined area, and during the summer season necessitates the maintaining of day and night supervision by quarantine officers of all main roads leading out of the regulated area. The scouting work is done throughout and beyond the known limits of distribution to determine the spread and abundance of the borer.

(i) PREVENTING SPREAD OF JAPANESE AND ASIATIC BEETLES.

Appropriation, 1930	$267,000
Budget, 1931	475,000
Increase	$208,000

The increase of $208,000 in this item is for (1) the enforcement of necessary quarantine restrictions, (2) scouting to determine the presence of the beetles in points outside of the area now known to be infested and (3) carrying on control operations at isolated points of infestation. Taking into consideration a supplemental estimate of $188,000 which is anticipated will be submitted for 1930, the actual increase over funds estimated to be available for use during the fiscal year 1930 is $20,000.

Situation Regarding the Japanese Beetle.--During the summer of 1929 the Japanese beetle was found in 31 new localities outside of the area now included under Federal quarantine. In many of these places only a few beetles were discovered, at others, however, a comparatively large number of beetles were collected. Among the new outlying points are Boston, Mass., Providence, R. I., Willimantic, Conn., Kingston and Binghamton, N. Y., Chambersburg, Pa., Brunswick, Md., and Cape Charles and Norfolk, Va. Within the regulated area the beetle has increased in abundance and the area now generally infested extends over considerably larger territory.

Situation Regarding the Asiatic Beetles.--The Asiatic beetles have been found in 12 localities outside of the quarantined area and specimens of these beetles have been collected in a number of new localities within the area regulated on account of these pests. Many of the new findings at points outside of the quarantined area consist of but a few specimens. In most cases, however, grubs were collected demonstrating the presence of soil infestation. The unusually dry summer apparently reduced the number of these beetles and injury in

certain parts of the infested area was not severe during the past summer. Inspections within the quarantine area have disclosed the presence of one or the other of these beetles in many nurseries where they were not known to occur last year.

Reason for Continuation in 1931 of the Amount Estimated to be Available in 1930.--Neither of the Asiatic beetles is attracted to bait, nor does either of them, like the Japanese beetle, frequent flowers and foliage during the daytime. The difference in habits of these beetles makes it impossible to locate them by the means employed in finding the Japanese beetle. Experience has indicated that even scouting done at night, when the Asiatic garden beetle flies, fails to secure satisfactory results. The most effective way of locating either of the Asiatic beetles is by making soil examinations in localities where their presence is suspected. The larger territory which needs to be examined for the presence of the Japanese beetle, the impossibility of determining the presence of the Asiatic beetles by the same means and at the same time as scouting is done for the Japanese beetle, makes it necessary to continue the expanded and modified method of scouting to determine the presence of these pests at points outside of the area known to be infested.

The occurrence of the beetles in or adjacent to areas in which regulated products are produced increases the cost of quarantine enforcement. Nurseries and greenhouses located within the quarantined area are grouped into classes depending on the presence of or proximity to infestations. The establishments in which beetles have been found and those located in areas generally infested must, in order to move their products to points outside of the quarantined area, treat them in a manner which will assure freedom from infestation. Such treatment must be done under the supervision and to the satisfaction of inspectors of the Department. Untreated soil around the roots of nursery stock, grown in infested nurseries, may contain eggs or larvae of the beetles and movement of such material into uninfested regions involves the greatest risk of long distance spread of these pests. The control of the movement of nursery stock represents the most effective way of preventing long distance spread. In 1931 it will be necessary to continue to supervise the handling of nursery stock at the same places where this work was done during 1930.

To retard and, in so far as practicable, prevent the spread of the beetles from isolated points of infestation, during the summer of 1929 control operations were carried on in cooperation with the States. Although the type of control work which has been done has not been conducted over a sufficiently long period to fully determine its value, the results so far obtained clearly indicate that the use of traps and similar controls materially aids in reducing the number of beetles at isolated points of infestation and correspondingly retards the spread from these localities. Rather than extend the quarantine to include all

outlying points and thus include uninfested territory intervening between the generally infested area and the isolated points, it is planned to continue during 1931 the policy of cleaning up or reducing the infestation at these outlying points. This work will be done in cooperation with the States but since it materially retards the spread into new regions, thus affording protection to the whole country, a portion of the expense should be paid from Federal funds.

The Necessity for the Actual Increase of $20,000.--The actual increase of $20,000 over funds estimated to be available for 1930 is needed for additional work incident to the supervision of the treatment of nursery stock. It is well known that the Japanese and Asiatic beetles are gradually and by natural means invading new localities within the regulated area. Coincident with this natural movement, these beetles reach nurseries or other establishments which desire to market their products in communities outside of the regulated area. In order that these concerns may ship their stock into uninfested regions it is necessary that it be inspected while being dug or treated under supervision by inspectors of the Department. The increase of $20,000 provides funds for the anticipated increased cost of this work.

Project Statement

Project	Expended 1929	Estimated 1930	Estimated 1931	Increase
Preventing Spread of Japanese and Asiatic Beetles	$371,000	$267,000	$475,000	$208,000

Activities under this Appropriation

The work done under this appropriation is to retard the spread of the Japanese and Asiatic beetles by the enforcement of quarantine restrictions with respect to commerce and movement of articles which might otherwise be a means of wide carriage of the pests out of the regulated area. Such restrictions require the inspection and certification of farm products, nursery stock, and other products likely to carry these pests, and the supervision of such disinfection or treatment as may be necessary to safeguard the movement of such products. It also provides for conducting or supervising cleanup work in isolated localities where incipient infestations of these pests have been determined.

PLANT QUARANTINE AND CONTROL ADMINISTRATION (Continued)

(j) PREVENTING SPREAD OF WHITE PINE BLISTER RUST.

Appropriation, 1930	$27,000
Budget, 1931	10,000
Decrease	$17,000

The decrease in this item is apparent rather than actual, inasmuch as this amount is transferred to the new item "Transit Inspection Service." In enforcing the quarantine on account of the white pine blister rust, a portion of the funds was used in the examination in transit of articles regulated by this quarantine. With the establishment of the new item for inspection in transit, an amount approximating past expenditures for this type of work has been transferred from the item Preventing Spread of White Pine Blister Rust and made a part of the new item for this specific purpose.

Project Statement

Project	Expended 1929	Estimated 1930	Estimated 1931	Decrease
Preventing Spread of Blister Rust	$26,363	$27,000	$10,000	$17,000

Activities under this Appropriation

The work under this appropriation deals with the enforcement of the quarantine on account of white pine blister rust and is done in cooperation with the States affected. It provides for inspection of nurseries in Washington, New York and New England States, in which pines susceptible to this disease are grown. It also provides for the regulation of the interstate movement of five leafed pines and currant and gooseberry bushes which might carry infection into new localities.

(k) PREVENTING SPREAD OF PHONY PEACH DISEASE.

Appropriation, 1930:	
Facial	$15,000
Less amount expended in 1929 under immediately available provision	955
Total available for 1930	$14,045
Budget, 1931	12,000
Actual decrease	$ 2,045
(Apparent decrease	3,000)

The decrease in this item is apparent rather than actual since a portion of the funds were used in the examination of nursery stock moving in transit and are transferred to the new item "Transit Inspection Service." The amount transferred to the new item is $3,000. The entire appropriation, included in the act for 1930, for preventing the spread of phony peach disease was made immediately available. Only a very small part, $955, of this was used during the fiscal year 1929, and this expenditure pertained to the work of the fiscal year 1930.

Change in Language

The language for this item has been amended by striking out that portion which provides that the appropriation be immediately available. It is anticipated that the amount available for 1930 will be sufficient to meet the needs during that year.

Project Statement

Project	Expended 1929	Estimated 1930	Estimated 1931	Decrease
Preventing Spread of Phony Peach Disease	$955	$14,045	$12,000	$2,045

Activities under this Appropriation

The work performed under this item is to prevent the spread of the phoney peach disease. It involves the regulation of the movement of nursery stock likely to carry infections into uninfested regions and scouting to determine the presence of the disease within or adjacent to commercial nurseries. The phony peach disease is known to occur in Georgia and Alabama and has recently been discovered in limited areas within the State of Mississippi.

(1) PREVENTING SPREAD OF MEXICAN FRUIT WORM

Appropriation, 1930:	
Facial	$85,000
Unexpended balance of amount for this purpose included in the First Deficiency Act, 1928, reappropriated for use during 1930	30,000
Total available, 1930	$115,000
Budget, 1931	115,000

Project Statement

Project	Expended 1929	Estimated 1930	Estimated 1931
Preventing Spread of Mexican Fruit Worm	$88,500	$115,000	$115,000

Activities under this Appropriation

The work under this item is to prevent reinfestation by the Mexican fruit worm in the lower Rio Grande Valley in Texas and to perpetuate and maintain the eradication results which have already been effected, involving the maintenance

of a host-free period during the summer months; inspection of some 60,000 acres of citrus groves and certification of fruits leaving the quarantined area; and the enforcement of other regulatory measures necessary to eradicate this pest in the United States.

In April, 1929, reinfestations of the Mexican fruit worm were found in some 14 different places within the Lower Rio Grande Valley. These reinfestations probably resulted from the presence of the pest in fruit in markets along the Mexican Border. The infestations were discovered at the beginning of the nonhost period and there was no fruit present in which the fly could breed. Intensive inspections have been carried on through the summer and it is believed that the fruit worm has again been eliminated from the Lower Rio Grande Valley of Texas.

(m) CERTIFICATION OF EXPORTS

Appropriation, 1930 ..... $30,000
Budget, 1931 30,000

Project Statement

Project	Expended 1929	Estimated 1930	Estimated 1931
Certification of Exports.....	$20,150	$30,000	$30,000

Activities under this Appropriation

This item provides for inspection and certification as to freedom from injurious insect pests and plant diseases of fresh fruits, vegetables, and plants, etc., intended for export, in order to meet the sanitary requirements of foreign countries. A fee is charged for this service which returns a considerable portion of the cost to the United States Treasury as miscellaneous receipts. During the fiscal year 1929, fees amounting to $9,191 were collected.

The work under this item is done at various ports throughout the United States. In recent years there has been an increase in the shipment of fresh fruits to certain foreign countries. This increase is particularly noticeable in certain countries of South America, such as Brazil, a country requiring Federal inspection and certification as a condition of entry. During the last summer and fall there has been an unusually large number of requests for inspection and certification of fruit intended for export. This increase may be partially accounted for by the desire on the part of foreign countries to be sure that the products were not produced in an area in which the Mediterranean fruit fly was known to exist.

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ENFORCEMENT OF THE GRAIN FUTURES ACT

Appropriation, 1930:	
Facial	$110,000
1928 unexpended balance reappropriated for use during 1930	30,000
Total available 1930	140,000
Budget, 1931	155,000
Actual increase	15,000
(Apparent increase.	45,000)

The increase of $15,000 is submitted for the following purposes:

(1) $10,600 to supervise the future trading activities at Seattle, Washington, and Portland, Oregon, and to study the general marketing conditions and other price factors in the Pacific Northwest territory, including the activities on the Vancouver Grain Exchange, a Canadian project.

The Seattle Grain Exchange has been in operation since 1926 and the work in connection with this market has been handled by our Chicago office. This arrangement has not been satisfactory, but it was desired to await developments in this section and defer the establishment of an office until the development in future trading reached the stage which would make it necessary.

The recent designation of the Portland Grain Exchange as a "contract market" and the increased development in the northwest section now makes it necessary that an office be established at Seattle in order that the administration may be able to effectively supervise the trading in these two markets as required by the terms of the Grain Futures Act. This will permit the studying at close range the various marketing problems, including the handling of cash grain, and assist in acquainting the producers with the functions of the futures market so that they may derive the fullest benefits. Until funds are available for the proper supervision of these two markets, incidental supervision is provided at a cost of approximately $1,000 by adjusting other activities.

(2) $4,400 is required to strengthen the Washington organization to make possible the gathering of special marketing information for permanent records and special studies, and for the information of producers, organizations, and other marketing agencies. Increasing demands are coming from these sources and from economists and research workers connected with the agricultural colleges for information and data bearing upon marketing questions. These are mostly of a character calling for separate attention and for material not gathered by our field offices. The volume of general technical correspondence also has grown to such an extent as to make it imperative that additional assistance be employed for the technical work in order that the administration may function in the proper manner.

ENFORCEMENT OF THE GRAIN FUTURES ACT (Continued)

Project Statement

Project	Expended 1929	Estimated 1930	Estimated 1931	Increase
Enforcement Grain Futures Act	$131,359	$140,000	$155,000	$ 15,000

Activities under this Appropriation

General

The appropriation is required to administer the Grain Futures Act (App. Sept. 21, 1922, 42 Stat. 998, U.S.C. 87-91). This Act places upon the Secretary of Agriculture the duty to designate and supervise all markets in the United States where grain is dealt in for future delivery. The enforcement unit is known as the Grain Futures Administration. The purpose of the law is to prevent manipulation of grain prices, to prevent the dissemination of false and misleading crop and market information, and to extend to cooperative associations the right to be represented on boards of trade and grain exchanges. Although licensing powers are exercised under the law, no license fees or revenues of any kind are collected.

In furtherance of effective supervision, a considerable amount of investigational work is necessary. The results of same are published from time to time, giving producers and others a better understanding of the marketing machinery and suggesting needed changes and reforms. Activities under this appropriation have resulted in cooperative associations being admitted to representation now in practically all of the principal contract markets. Higher standards of integrity and business ethics are being fostered through the business conduct committees established to cooperate with the Grain Futures Administration. On several occasions prompt action has prevented what otherwise would have developed into serious congestion in delivery months. Questionable practices are uncovered from time to time and steps are taken as rapidly as possible to analyze their effects and to secure their removal.

Markets meeting the requirements of the Act are designated "contract markets." There are now 11 active contract markets, located in 10 cities. Field offices are maintained at Chicago, Minneapolis, Kansas City, and Sacramento and another office is being established at Seattle. The exact nature of the supervision work is best described in connection with the Chicago office.

Headquarters: Washington, D. C. This office has charge of the general administrative work and directs the supervisory and investigational activities of four field offices located respectively at Chicago, Illinois; Minneapolis, Minnesota; Kansas City, Missouri; and Sacramento, California.

Chicago field office. From this office are supervised the future

trading activities of the Chicago Board of Trade, the Chicago Open Board of Trade, the Milwaukee Chamber of Commerce, and the St. Louis Merchants Exchange. At present reports are being received at this office covering also transactions on the Seattle Grain Exchange. Each day the Chicago office receives reports from 140 to 150 clearing members of the Chicago Board of Trade alone. The reports show (1) the total purchases and sales of each future, (2) the aggregate of all accounts "long" and all accounts "short" in each future, and (3) the position in the market of what is known as special accounts, i. e., those having a market interest equal to an amount fixed from time to time by the Grain Futures Administration. These reports are required to be filed each day not later than 9:30 A. M. and cover the previous day's transactions. The compiled figures on volume of trading and open commitments are released at noon. Reports from members of the Chicago Open Board of Trade, Milwaukee Chamber of Commerce, and the St. Louis Merchants Exchange are handled in the same way, except that they are received by mail, and, being of less importance, are not given publication as early as are the Chicago Board of Trade figures. The special accounts are studied by the local supervisor, together with "ticker gossip" items and other crop and market information, with a view to determining factors which influence grain prices. General observations are made of the activities of the entire grain marketing machinery and a constant check is made of market news and market conditions with a view to determining authenticity, locating sources, and correcting false and misleading information.

There is maintained at Chicago a small staff of accountants and economists for investigational and research work incidental to an effective enforcement program for all markets. Accountants are also utilized to make examinations from time to time of the accounts and records of contract market members located in Chicago as well as other places.

Minneapolis and Kansas City field offices. The description of work conducted from the Chicago office applies also to these offices excepting that it is of smaller volume. The same routine is followed in the handling of reports and in the daily supervisory work. Supervision over the Duluth Board of Trade, as well as over the Minneapolis Chamber of Commerce, is had through the Minneapolis office.

Sacramento field office. This office is maintained under a cooperative arrangement with the State of California and with a supervisor giving part time only to the work. Supervision is maintained from here over the contract markets located at San Francisco and Los Angeles, California, and Portland, Oregon.

Seattle field office. An office is to be established here in the immediate future to afford more direct contact with the Pacific Northwest and to effect closer supervision over the markets at Seattle, Washington, and Portland, Oregon. This office will also furnish opportunity to observe trading and market conditions on the Vancouver, B. C., exchange.

Change in Language

The language of this item has been amended by omitting the following clause: "together with $30,000 of the unexpended balance of the appropriation for this purpose for the fiscal year 1928".

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FOOD AND DRUG ADMINISTRATION

A change in name from Food, Drug and Insecticide Administration to Food and Drug Administration is submitted as it has been found that the present name is long and cumbersome. Furthermore, the word "drug", in a broad sense, covers insecticides and the word "insecticide" is, therefore, superfluous.

(a) GENERAL ADMINISTRATIVE EXPENSES

Appropriation, 1930	$104,000
Budget, 1931	104,000

Project Statement

Project	Expended 1929	Estimated 1930	Estimated 1931
General Administrative expenses	$102,534	$ 104,000	$ 104,000

Activities under this Appropriation

Overhead expenses, such as general supervision, accounting, editorial work, purchase and distribution of supplies, filing, recording, plumbing, electrical and mechanical work and the like, applicable to operations in connection with all the acts enforced by the Food and Drug Administration, are paid from this appropriation.

(b) COLLABORATION WITH OTHER DEPARTMENTS

Appropriation, 1930	$16,300
Budget, 1931	-
Decrease	$16,300

This item and the appropriation for it are omitted as after the current fiscal year work for other Departments of the Government will be paid for by the Departments requesting the work, pursuant to a general provision submitted in the 1931 Budget under "Miscellaneous". The present arrangement has not proved satisfactory.

Project Statement

Project	Expended 1929	Estimated 1930	Estimated 1931
Tests for other Depts.	$15,694	$ 16,300	$ -

Activities under this Appropriation

Foods, drugs, insecticides, and disinfectants furnished on contracts to the army, navy, marine corps, veterans' bureau and other Governmental agencies, or requiring analysis in connection with the official work of such agencies, are tested upon request to determine whether or not they comply with contract specifications. In 1931 and thereafter such work will be paid for by the Departments requesting the work.

FOOD AND DRUG ADMINISTRATION (continued)

(c) ENFORCEMENT OF THE FOOD AND DRUGS ACT

Appropriation, 1930	$1,030,000
Budget, 1931	1,105,000
Increase	$ 75,000

The increase of $75,000 in this appropriation is asked to check the development of certain growing abuses in the food and drug industries that threaten serious consequence to consumers and to the industries involved. The rapid growth of the food and drug industries and especially the ever increasing proportion of such products that enter interstate or foreign commerce and thus become subject to the act make it impossible for the present personnel and facilities to cover adequately even the more flagrant forms of adulterations that are from time to time revealed by our investigations of trade or consumer complaints or by outbreaks of food poisoning. These violations, if continued unchecked, may bring most serious consequences to consumers and disaster to the industries involved. This increase is submitted for the following purposes:

$35,000 for testing drugs and medicines. Recent surveys have shown that some drugs prescribed by physicians in the most serious diseases are much below or much above the proper potency. Either is extremely dangerous. Proprietary preparations which are practically worthless are being sold for use in the treatment of most dangerous diseases. Worthless remedies for stock and domestic animals are being sold with false claims as to their curative power. Recent investigations have shown that many so-called antiseptics, widely distributed through the channels of commerce, have little or no potency. It is essential that additional medical experts and drug analysts be provided in order that this work may be handled adequately.

$15,000 for inspection of poultry. Investigations made about one year ago showed that large quantities of diseased and spoiled poultry, known in the trade as culls, were bought in the large markets and used in canning and in various manufactured food products, or in restaurants in products where their true nature can be concealed. Some of the poultry in this class have died of, or been affected with, roup, tumors, cancer, and other diseases. Some were highly tubercular and some had undergone decomposition. Work carried on during recent months has broken up to a considerable extent the practice of selling this cull poultry in large lots to manufacturing plants. However, while the distribution in large lots of the obviously objectionable material has been checked it is evident that even greater supervision of an expert character will be necessary to prevent unfit poultry from being incorporated with what is supposed to be "first" or "second" class poultry and so distributed through the channels of commerce. Because of the immense quantities of poultry distributed and the extensive territory covered by the poultry business, it is essential to have additional funds to properly inspect the products of this great industry in the enforcement of the food and drugs act.

$10,000 for inspecting imported foods. It is urgently necessary to increase the personnel and facilities at the larger ports of entry for examining foods and drugs offered for entry into the United States. As a result of a recent outbreak of food poisoning from imported foods and the discovery that certain other imported canned foods are underprocessed, it is now necessary to

make bacteriological examination of practically all non-acid canned foods offered for entry into the United States. This can be done at the present time only by discontinuing the inspection of other products which are probably adulterated or misbranded, though less dangerously so, than underprocessed canned foods. It is necessary also that the inspection of imported figs be extended.

$15,000 for spray residue removal. Additional work is required to insure that the excess spray residue on fruit be reduced to the more rigid tolerance necessary to protect public health and prevent irreparable injury to the fruit industry that will inevitably result through the action of foreign governments and State and city health officials unless the world tolerance for arsenic is reached and maintained as soon as practicable.

The more rigid tolerance established for spray residue on fruit makes it necessary to extend the regulatory work as carried on in the far West to certain fruit growing sections in the Middle West and the East. This work involves the inspection of fruit to see that it does not contain any excess spray residue when shipped within the jurisdiction of the Federal food and drugs act. This work supplements, but in no way duplicates, the work done by the Bureaus of Entomology, Plant Industry and Chemistry and Soils.

Project Statement

Project	Expended 1929	Estimated 1930	Estimated 1931	Increase
Supervision of interstate and foreign commerce in foods and drugs	$ 19,791	$ 20,020	$ 20,020	$ -
Review and presentation of evidence in Court cases	49,477	50,060	50,060	-
Food control investigations	113,798	115,130	115,130	-
Drug control investigations	64,321	73,875	103,875	30,000
Inspection of commerce in food and drugs ...	742,162	770,915	815,915	45,000
Total	$989,549	$1,030,000	$1,105,000	$75,000

Activities under this Appropriation

General

This appropriation provides all the expense necessary for enforcing the food and drugs act, commonly called the pure food law (June 30, 1906, 34 Stat., 768-772, U.S.C., 621-624). The purpose of this act is to prevent the shipment in interstate or foreign commerce, and the manufacture and sale in the District of Columbia and other territory in which the Federal Government has jurisdiction, of adulterated or misbranded foods and drugs. To enforce this act it is necessary to maintain supervision of the enormous volume

of foods and drugs shipped in its jurisdiction. This requires the inspection of food factories, the examination of shipments of foods and drugs, the analysis of samples, and the presentation of evidence in court.

(d) ENFORCEMENT OF THE TEA IMPORTATION ACT

Appropriation, 1930 . . . . . $43,800
Budget, 1931 43,800

Project Statement

Project	Expended 1929	Estimated 1930	Estimated 1931
Enforcing Tea Act	$43,337	$ 43,800	$ 43,800

Activities under this Appropriation

Under the Tea Importation Act (Mar. 2, 1897, 29 Stat. 604, U.S.C., 625,626), every consignment of tea imported into the United States is inspected both as to purity and quality. A board of tea experts determines a suitable standard for tea each year, and no tea for beverage purposes is permitted entry into the United States that falls below that standard. Before the enactment of the Tea Importation Act much low grade tea that was unfit for use was sent to the United States.

(e) ENFORCEMENT OF THE NAVAL STORES ACT

Appropriation, 1930 . . . . . .$39,500
Budget, 1931 39,500

Project Statement

Project	Expended 1929	Estimated 1930	Estimated 1931
Enforcing Naval Stores Act	$ 39,019	$ 39,500	$ 39,500

Activities under this Appropriation

The Naval Stores Act (Mar. 3, 1923, 42 Stat., 1435, U.S.C. 93, 94), provides that the Secretary of Agriculture "shall examine, if practicable, upon request of any interested person, any naval stores and shall analyze, classify, or grade the same on tender of the cost thereof as required by him, under such regulations as he may prescribe. He shall furnish a certificate showing the analysis, classification or grade of such naval stores, which certificate shall be prima facie evidence of the analysis, classification, or grade of such naval stores and of the contents of any package from which the same may have been taken as well as of the correctness of such analysis, classification or grade and shall be admissible as such in any court."

The Secretary is authorized to purchase from time to time samples of

spirits of turpentine and of anything offered for sale as such for the purpose of analysis, classification, or grading, and of detecting any violation of the Act. Naval stores offered for import or export as well as naval stores that enter interstate commerce are subject to all the provisions of the Act.

(f) ENFORCEMENT OF THE INSECTICIDE ACT

Appropriation, 1930 . . . . . $ 224,000
Budget, 1931 224,000

Project Statement

Project	Expended 1929	Estimated 1930	Estimated 1931
Inspection of domestic and import shipments of insecticides and fungicides, development of cases and State cooperation	$ 62,847	$ 63,825	$ 63,825
Chemical, microscopic and bacteriologic examination of insecticides and fungicides (including disinfectants)	105,492	103,185	103,185
Testing of efficacy of fungicides and action on foliage of insecticides	24,690	25,075	25,075
Testing of efficacy of insecticides and their action on foliage	31,423	31,915	31,915
Total	$224,452	$224,000	$224,000

Activities under this Appropriation

The Insecticide Act (Apr. 26, 1910, 36 Stat., 335, U.S.C. 95-97), places upon the department the responsibility of regulating interstate shipments and importations into the United States at the various ports of entry, of insecticides and fungicides. The provisions of the law are designed to protect farmers, fruit growers, market gardeners, and stock and poultry raisers from fraudulent, misbranded, and adulterated insecticides and fungicides. Products used to rid the household of insects, and disinfectants, germicides, etc., which are used to combat or kill bacteria also come within the scope of the work. The enforcement of the law has had a marked effect upon the industry engaged in the manufacture and sale of insecticides and fungicides, and each year sees progress in the direction of more truthful statements and a higher quality in most of the products on the market. However, the manufacturing and use of insecticides and fungicides has tremendously increased since the inception of this regulatory work and the Department is constantly confronted with new problems and new products, requiring inspection. Especially important at present are disinfectants, boll-weevil remedies, lice preparations, calcium arsenate, lime-sulphur preparations, and fungicides used on the Pacific coast.

(g) ENFORCEMENT OF THE MILK IMPORTATION ACT

Appropriation, 1930 . . . . . $53,000
Budget, 1931 53,000

Project Statement

Project	Expended 1929	Estimated 1930	Estimated 1931
Enforcing Milk Importation Act	$52,332	$ 53,000	$ 53,000

Activities under this Appropriation

Approximately 12,000,000 gallons of milk and cream are imported annually from Canada. It is estimated that the milk and cream are supplied by about 500 shippers, covering approximately 15,000 individual dairies. It is estimated that these dairies use milk from at least 100,000 cows. The Milk Importation Act (Feb.15,1927, 44 Stat., 1103,U.S.C. Supp.1,110,111), provides for inspection both at the source and at the ports of entry. The work of enforcing this Act, therefore, involves the supervision of the sanitary inspection of about 500 Canadian shipping plants and approximately 15,000 dairies, and supervision of the physical examination and in most instances tuberculin test once a year of at least 100,000 cattle, this work being carried out in collaboration with Canadian officials as authorized by the act; it also involves the bacteriological examination and temperature test of sufficient representative samples of 12,000,000 gallons of milk and cream, to insure compliance with the Act at ports of entry. Milk may be brought into the United States at any port of entry along the Canadian border, but the bulk of the milk and cream comes in through ports of entry in New York and the New England States.

(h) ENFORCEMENT OF THE CAUSTIC POISON ACT

Appropriation, 1930 . . . . . $26,700
Budget, 1931 26,700

Project Statement

Project	Expended 1929	Estimated 1930	Estimated 1931
Enforcing Caustic Poison Act	$26,236	$ 26,700	$ 26,700

Activities under this Appropriation

The Caustic Poison Act (Mar. 4, 1927, 44 Stat., 1406-1410; U.S.C.Supp. 1, 73-75), imposes upon the Department the obligation of seeing that the large number of preparations containing caustic or corrosive substances and sold in interstate or foreign commerce for household use are correctly labeled with the common name of the substance, with the word "Poison", with directions for treatment in case of accidental personal injury, and with the name and place of business of the manufacturer, packer, seller or distributor. To enforce this Act, samples must be collected from the products determined by chemical analysis, and such tests made as will establish whether any or all of the ingredients are caustic or corrosive, and whether the directions given in case of injury are correct and adequate.

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Note.- See also Miscellaneous Section for "Services to other Departments."

INTERCHANGE OF APPROPRIATIONS

There is no change in the provisions of this paragraph which gives the Department authorization of the greatest value when emergencies arise.

It allows not to exceed 10 per centum of the foregoing amounts for the miscellaneous expenses of the work of any bureau, division, or office herein provided to be available interchangeably for expenditures on the objects included within the general expenses of such bureau, division, or office.

As called for in the proviso, a statement of these transfers for the fiscal year 1929 will be found in the Budget under this item.

MISCELLANEOUS

(a) SERVICES TO OTHER DEPARTMENTS

The new language proposed under the Miscellaneous Section takes the place of two separate existing provisions in the Agricultural Act, one the general provision for inspections for other Government agencies, which while applicable to all bureaus has as a matter of convenience been carried as a proviso on the appropriation item Meat Inspection, and the other an appropriation of $16,300 under the Food, Drug, and Insecticide Administration, entitled "Collaboration with other Departments." Both existing provision, including the $16,300 appropriated, are dropped in the 1931 Budget, and the new language is proposed in order that the various branches of the Department of Agriculture may, upon request, continue to render technical services for which the Department of Agriculture staff is qualified, to any other Government agency requiring such services, the cost of the same, including personal services, being met by the Government agency requiring the services of the Department of Agriculture, either by transfer of funds or reimbursement, thus placing the rendering of such services on a businesslike basis which will facilitate the operations of the Government as a whole.

The proposed substitute section places the services of the Department of Agriculture at the disposal of other Governments requiring such services in substantially the same manner as the services of other bureaus, such as the Bureau of Standards (since 1921), the Bureau of Mines (since 1923), and the Geological Survey (since 1927).

For many years the Agricultural Appropriation Acts, under the Bureau of Chemistry (Food, Drug, and Insecticide Administration since late reorganization) have carried an appropriation for collaboration with other departments of the Government requiring and requesting chemical investigations. The work consists in chemical examinations of food supplies for the Army, Navy, Marine Corps, Veterans Bureau, and other branches for compliance with contract specifications. The funds have been inadequate to service demands, but since the appropriation implied a limit set by Congress, requesting departments which would have been glad to pay for additional services have been necessarily denied. The new language by dropping the former appropriation and placing the expense where it logically belongs - with the requesting department rather than with the Food, Drug, and Insecticide Administration, to whose primary statutory functions the food tests in question are altogether foreign- makes possible the full measure of the Administration's utility as a coordinating Federal unit.

At the same time the new provision supersedes by merger the former authorization, under the Meat Inspection appropriation, under which the Department might upon request of any branch of the Federal Government perform inspections of food and other products with reimbursement of costs, including salaries and expenses.

The language of the provision included in the 1931 Budget and the two existing provisions which are omitted are stated below, for convenient reference:

1931 Budget

"Work for other departments - During the fiscal year 1931 the head of any department or independent establishment of the Government requiring inspections, analyses and tests of food

MISCELLANEOUS (Continued)

and other products, within the scope of the functions of the Department of Agriculture and which that department is unable to perform within the limits of its appropriations, may, with the approval of the Secretary of Agriculture, transfer to the Department of Agriculture for direct expenditure such sums as may be necessary for the performance of such work."

Items existing 1930 - Omitted in 1931 Budget

"Provided, That the Department of Agriculture may, upon request of any branch of the Federal Government, perform inspections of food and other products and receive reimbursement of the cost of such inspections, including salaries and expenses, out of appropriations available therefor."

"For collaboration with other departments of the Government desiring chemical investigations and whose heads request the Secretary of Agriculture for such assistance, and for other miscellaneous work, $16,300."

(b) EXPERIMENTS IN LIVESTOCK PRODUCTION IN SOUTHERN UNITED STATES

Appropriation, 1930	$43,500
Budget, 1931	48,500
Actual increase	5,000
(Actual amount for increased work.....	8,000)

The increase of $8,000 is submitted for the following purposes:

This increase of $8,000 is badly needed to cover the cost of installing a water supply system, the erection of silos to replace those now in use which are in poor condition, repairs to fences, barns, and other property. The work at Jeanerette has been conducted during the past few years with only sufficient funds to take care of the absolutely essential items. Conditions have reached a point where it is necessary to make changes and improvements in the plant and equipment or it will be impossible to continue the work on an economical basis. A water supply system is needed to safeguard health and lives of the employees.

Project Statement

Project	Expended 1929	Estimated 1930	Estimated 1931	Increase or decrease
Experiments in livestock production in S. U.S.				
Operating Expenses.....	$41,000	$40,500	$48,500	+ $8,000
Construction of bridge over Bayou Teche.....	—	3,000	- -	- 3,000
Total.....	41,000	43,500	48,500	+ 5,000

MISCELLANEOUS (Continued)

Activities under thisAppropriation

General

The work at Jeanerette, La., is to determine the best methods of producing livestock and of making it a substantial part of the agriculture of the region, with the end in view that more profitable diversified systems of farming may be developed, and by-products of the cotton, rice, and sugar industries utilized with profit, at the source of thier production . Investigations are conducted in the establishment, improvement, and utilization of pastures and to determine the best methods of providing harvested forage for the production of livestock in the Gulf Coast region. Experiments with beef cattle include a determination of the best method of handling the beef breeding herd; a comparison of the relative values of different silages; a comparison of the rate and economy of gains of Hereford cattle produced on the farm and fed the same ration; a study of the effect of breeding and sex upon the quality of beef; a determination of the relative feeding values of rice products in fattening rations fed range-bred steers and the effect of these feeds upon the quality of meat. An experimental dairy herd of Jersey cattle is maintained to demonstrate the best practices for feeding, breeding, and managing dairy cattle. Experiments with swine are to determine the cost of producing pigs and growing them to maturity when fed on various rice by-products and a comparison of the quality of the pork with that produced with corn and tankage. Experiments with horses and mules consist in breeding the work mares of the station to a purebred jack with the object of determining the comparative usefulness of good quality mules and horses for the farm work of the region.

(c) EXPERIMENTS IN DAIRYING AND LIVESTOCK PRODUCTION IN WESTERN UNITED STATES

Appropriation, 1930	$60,500
Budget, 1931	65,500
Increase	5,000

This appropriation is allotted to the Bureau of Animal Industry and the Bureau of Dairy Industry, as follows:

(1) ALLOTMENT TO THE BUREAU OF ANIMAL INDUSTRY

Allotment, 1930	$22,035
Budget, 1931	22,035

(2) ALLOTMENT TO BUREAU OF DAIRY INDUSTRY

Allotment, 1930	$38,465
Budget, 1931	43,465
Increase	5,000

The increase of $5,000 is for enlarging the dairy barn at the Huntley Field Station to provide the necessary facilities for an increased number of

animals. The herd at this station is now approaching a high degree of homoqygosity for the factors determining a high level of production. Valuable herd sires are in use at the station and it is desirable to increase the size of the herd that the benefits of the breeding herd may go further. Herd sires from this herd are heading the herds of the Utah Experiment Station, the Oregon Agricultural College, Clemson Agricultural College, the Woodward Experiment Station, the Mandan Experiment Station, and the Montana Agricultural College.

Project Statement
(Bureau of Animal Industry)

Project	Expended 1929	Estimated 1930	Estimated 1931
Experiments in dairying and livestock production in Western U. S. located at:			
Ardmore, S. D.	$ 6,060	$ 6,300	$ 6,300
Havre, Montana.....	1,200	1,300	1,300
Huntley, Montana.....	80	500	500
Miles City, Montana	4,000	5,260	5,260
Newell, S. D.	1,299	1,600	1,600
Stamford, Texas	8,640	7,075	7,075
Total	21,279	22,035	22,035

Project Statement
(Bureau of Dairy Industry)

Project	Expended 1929	Estimated 1930	Estimated 1931	Increase
Ardmore Field Station	$ 9,086	$ 9,065	$ 9,065	- - -
Huntley Field Station.....	14,860	14,600	19,600	$5,000
Mandan Field Station	14,604	14,800	14,800	- - -
Total	38,550	38,465	43,465	5,000

Activities under this Appropriation
(Bureau of Animal Industry)

General

At various points in the western part of the United States experiments are conducted for the purpose of solving problems in livestock production which

are applicable over large areas of the West.

Ardmore, S. D. Experiments in livestock production under conditions typical of dry land agriculture show that wheat grass and alfalfa hay are of equal value in wintering rations for steers. A study is made of the comparative profits of producing feeder pigs for sale on the general market, fattening them on feeds grown in the dry land areas, the pigs being used also in suckling-pig immunization work.

Havre, Mont. In experiments with beef cattle results show that hays produced in that region are more economical as wintering roughages than corn fodder. Barley has proved more satisfactory than rye. In studies of farm-sheep raising problems it was found that sweet clover was better than oat hay. It was found that spring rye was superior to winter rye for fatening fall pigs and that Durham wheat was superior to both.

Huntley, Mont. Sows are maintained for the production of pigs necessary for determining the livestock values of various crops produced on the irrigated experiment plots.

Miles City, Mont. The work is carried in conjunction with many projects under the animal husbandry appropriation. Studies are made of beef cattle, sheep, swine, the production of saddle and work stock suitable for range conditions, and efficient utilization and management of range pasture lands. A long-time range cattle production program has been worked out, which will take into consideration all problems affecting beef cattle production in the Northwest. Fattening and wintering experiments are conducted to determine the most economical methods. A herd of swine is used in type and carcass studies to determine the best method of producing Wiltshire sides and for testing methods of producing market hogs. Purebred Morgan, Thoroughbred, and Belgian stallions are being used on purebred Morgan and grade saddle stock to determine the most desirable types of horses for saddle and work stock for range use.

Newell, S. D. Sheep investigations include studies of farm sheep problems under irrigation farming conditions. Four primary projects are in progress, pasture utilization, sheep feeding, lamb production, and wool production.

Stamford, Tex., is headquarters for investigations on ranch problems conducted with a view to increase the net income of the ranchers through organization and more economical livestock production. It has been found that net returns are influenced largely by the percentage of calf crop. Careful analysis of the data collected shows that the factors responsible for the low percentage calf crop are: Failure to supply sufficient winter feed, contagious abortion, failure to condition bulls previous to breeding, and poor management of grazing land. It has been found in the Edwards Plateau region cattle, sheep, and goats can be handled advantageously on the same ranch. A number of publications, both Federal and State, have been issued. As a result of this investigation extensive use of the data obtained is made in

the way of reorganization and improved methods that will result in lower costs and greater net returns.

Activities under this Appropriation
(Bureau of Dairy Industry)

General

The dairy work under this appropriation is conducted at Mandan, North Dakota; Huntley, Montana; and Ardmore, South Dakota; where field stations are established to demonstrate the most modern practices in dairy husbandry in the regions which they serve. The work of these stations is divided into two principal lines of investigation (a) breeding, and (b) feeding and management. At each station a herd of purebred Holstein-Friesian cattle is maintained, the herds varying in size according to the demands of the region served.

Breeding: These investigations involve the breeding of a pure line for high production by the continued use, for generation after generation, of sires that have proved their ability to transmit uniformly high production. Young purebred sires are placed with farmers in the vicinity of the station under cooperative agreements to be proved as to their capacity for transmitting high milk and butterfat production. The effectiveness of this work may be judged from the following facts: Of the twelve bulls born in the Huntley herd that have already been proved, eight are now heading purebred herds of the Bureau of Dairy Industry, State agricultural colleges, and other Government institutions. During the process of proving these animals in farmers' herds a large number of calves were obtained. Many of these calves, both males and females, have been widely distributed throughout the Yellowstone Valley with the result that the average production of cows in that region has been doubled. This work has also made it possible for farmers to obtain young purebred males at a nominal cost. Similar results have been or will eventually be obtained at the other stations.

Feeding and management: The feeding and management work at these stations is similarly conducted, the only difference being that feeding and management practices must be varied to utilize to the fullest extent the native grasses and the crops that can be most economically produced at each station and to meet the prevailing local conditions in the management of the animals.

MISCELLANEOUS (Continued)

(d) PASSENGER CARRYING VEHICLES

As required by the provisions of the Act of July 16, 1914 (U. S. C., p. 33, sec. 78), the Department has submitted in tabular form a complete detail of its requirements for passenger-carrying vehicles for field use during the fiscal year 1931. Heretofore, both the aggregate allotment thus shown for purchase of such equipment and the aggregate allotment shown for maintenance, repair, and operation have been specifically authorized in the text-matter of the bill. In the Budget for 1931 provision is requested for continuation of specific authorization for purchases, but in the case of maintenance a general authorization only is requested, the specific limitation on maintenance having been omitted. Since maintenance expenditures are predicated upon mileage, which is impossible of exact estimation a year in advance, and since, also the provision for maintenance on the basis of a specific limitation requires a system of allotments and subsequent reallotments within the Department, a simplification of routine work and a greater flexibility in the use of maintenance funds will be gained under the suggested omission. It should be noted in this connection that there will still remain in the text the specific limitation, included for several years past, restricting expenditures for repairs on any one car to not to exceed one-third of its replacement cost, and in any event not to exceed $500, during the year. While, therefore, a specific limitation of purchases is continued by the revised item, the amount for maintenance, repair, and operation is left subject to the general maintenance and upkeep restriction as regards any one vehicle. The textual changes indicated would place the system on this basis.

An amendment of language is also suggested to except busses from the $500 limitation and otherwise to confine its application to passenger-carrying units, as is the case in other departments, the Comptroller General, in a recent decision, having pointed out that the context of this Department's authority makes the restriction applicable to its non-passenger-carrying units also, which was not intended when the limiting language was inserted in the bill several years ago. The exception sought for busses will permit annual expenditures in excess of $500, when necessary, in connection with the maintenance and operation of two large vehicles of this type now employed in the group transportation of members of the Department's scientific staff between the laboratories and offices in Washington and the nearby experimental farms and stations.

The following table shows, in brief summary form, the distribution, by bureaus, of the present passenger-carrying equipment and of the additional equipment which the suggested increase of $65,000 in the purchase allotment will provide:

MISCELLANEOUS (Continued)

Bureau	On Hand June 30 1930	To Be Replaced in 1931.	Additions During 1931.	Total Fleet 1931.
Experiment Stations	0	0	2	2
Animal Industry	184	31	10	194
Dairy Industry	0	0	1	1
Plant Industry	14	1	28	42
Forest Service	82	5	13	95
Chemistry and Soils	1	0	0	1
Entomology	20	3	19	39
Biological Survey	9	1 truck	2	11
Public Roads	21	2 and 1 truck	6	27
Agric. Economics	69	32 and 18 trucks	35	104
Plant Quar. & Contr. Administration	142	1	16	158
Food, Drug & Insect. Administration	1	0	0	1
Totals.	543	75 and 20 trucks	(1) 132	(2) 675

(1) Total includes 20 truck replacements and 4 railroad speeders.

(2) This total is made up of 619 ordinary automobiles (Passenger-carrying), 3 busses, 2 motorcycles, 47 railroad speeders, and 4 horse-drawn vehicles.

MISCELLANEOUS (Continued)

The additional units required in 1931 (see column headed "Additions during 1931" in foregoing table) are explained as follows:

Office of Experiment Stations - One for the Alaska Experiment Station and one for the Virgin Islands Experiment Station. They will be used by station forces in visiting cooperators, and in the transportation of mail and supplies.

Bureau of Animal Industry - Five will be used by veterinary inspectors in 11 states in visiting farms and premises to make tuberculin tests and in carrying on other work connected with tuberculosis eradication; two by veterinary inspectors in Iowa and Illinois in travel to farms in connection with the eradication of hog cholera; three by inspectors in charge in Oregon, Ohio, and New York in travel to and from abattoirs and meat-packing plants under Federal supervision.

Dairy Industry - One, for use of farm superintendent at the experiment station near Beltsville, Md., in travel to Beltsville and nearby points on station business.

Bureau of Plant Industry - The 28 additional units will be distributed among the following projects: Four to dry land agriculture (shelter belt work); one to western irrigation agriculture in the investigation of occurrence of boron and other injurious elements in irrigation waters; three to horticultural crops and diseases work; two to cotton production and diseases work; three to work in forest pathology; and fifteen in blister rust control work. Four of these cars will be used by employees who have heretofore been operating personally-owned cars on a mileage reimbursement basis, but where annual mileages have now increased to the point where it will be less expensive to the Bureau to own and operate its own cars. The fifteen units estimated for in blister rust control work call for a special explanation: These cars will be used in Maine, New Hampshire, Vermont, Massachusetts, and New York. Up to the present time personally-owned cars have been employed on a mileage basis, but increasing mileages now make it more economical to operate bureau-owned cars. In blister rust control field work, the bureau requires a vehicle of the light truck type which, while having adequate space for the necessary field equipment and supplies, such as shovels, axes, camping equipment, 100-pound bags of various chemicals, etc., provides also comfortable and protected space for the driver, as frequently the men using these cars must make long trips and be out in all kinds of weather. To meet these requirements it is necessary to purchase equipment with the driver's compartment of coupe or roadster type with a pick-up truck body in the rear. Under a recent decision of the Comptroller General such equipment is held to be passenger-carrying, and as such must be specifically authorized. It is estimated that these fifteen units will cost $9,000.

Forest Service - Four of the 13 additional units are railroad speeders for use in fire control and timber sale administration work. Six of the remaining nine units will be assigned to six forest experiment stations., one to each, and will be used in research work in timber growing, yields, cutting methods, and forestation; one will be used in taxation inquiry work out of New Haven, Conn.; one will be used by the district forester in charge of the Lakes States District in general administration work; and one by the district engineer and assistants in the California District in the supervision of road construction projects.

Bureau of Entomology - One unit will be assigned to the research laboratory which has been established at Whittier, Calif., for the study of tropical and subtropical insects and will be used to visit various citrus

groves and bulb plant greenhouses; one to Walla Walla, Wash., for use in wire worm investigations; one to Columbus, Ohio, for use in Mexican bean beetle work in Ohio, New York, New Jersey, Maryland, and Delaware; seven units will be used in cereal and forage insects work, one each at Wichita, Kans. (Hessian fly investigations), New Orleans, La. (Sugar cane and rice insects investigations), West Lafayette, Ind. (Hessian fly investigations), Tempe, Ariz. (Alfalfa and forage insects investigations), Arlington, Mass. (Colonization of European corn borer parasites), Monroe, Mich. (similar work), and Salt Lake City, Utah, (observation of alfalfa weevil conditions and colonization of parasites); five units will be used in southern field crop insects work, one each at Tallulah, La. (visiting experimental plots where large scale dusting experiments are under way), El Paso, Tex., (cotton insects investigations, especially the pink bollworm), Bryan, Tex. (similar work), Florence, S. C. (studying boll weevil conditions), and Stillwater, Okla. (developing control measures against the cotton boll weevil); four units will be used in studies of insects affecting man and animals, one each at Mound, La. (in visiting numerous plantations where mosquito life history and control investigations are being conducted) and Coachella, Calif. (in determining breeding areas of the eye-gnat), and two at the laboratory to be established in Florida (to investigate sand-fly conditions and devise means of control).

Biological Survey - Two new cars, one of which will replace a truck, are asked for in predatory animal and rodent control work. They will be used by leaders in this project in inspection and contact work.

Public Roads - The six additional cars, one of which will replace a truck, will be used by agricultural, irrigation, and drainage engineers in field investigations of agricultural engineering problems.

Bureau of Agricultural Economics - While 35 additional units are requested, 18 of them will replace truck units now in use, leaving only 17 real additions to the bureau service fleet. Of these 17, one will be used in the Great Plains area for transporting farm management specialists engaged in research studies of farm management and practice, six (one each at Denver, Colo. Springfield, Ill., New Orleans, La., Lafayette, Ind., Topeka, Kans., and Louisville, Ky.) in transporting crop and livestock estimators engaged in making such estimates, five (one each at the market centers of Chicago, Ill., Cincinnati, Ohio, New Orleans, La., San Antonio, Tex., and Portland, Oreg.) by market reporters in collecting market information, and five at various market centers by inspectors of farm products in making shipping-point inspections of fruits and vegetables. The 18 trucks listed for replacement by passenger-carrying units, referred to in the beginning of this paragraph, are being used in the Estimates of Cotton Grade and Staple work. By 1931 these trucks will have to be replaced by either cars or trucks, as by that time they will each have run approximately 50,000 miles. Because of the passenger-carrying element involved in their use, passenger-carrying units should be provided, the expense being no greater, and the vehicles being used by technical employees whose duties require them to drive long distances in all kinds of weather.

Plant Quarantine and Control Administration - Of the sixteen additional unites requested for this bureau, one will be used by the project leader and district foremen in traveling throughout the Mexican fruit worm area, two by scout leaders supervising gypsy moth scouting and control work, one by the project leader and district foremen in traveling throughout the date scale area, four in travel of district supervisors in pink boll worm work where train service is absolutely impracticable, and eight by foreign plant quarantine inspectors at as many different ports of entry.

MISCELLANEOUS (Continued)

(e) MILEAGE RATES FOR MOTOR VEHICLES

There is no change in this paragraph except that the fiscal year has been changed from 1930 to 1931.

This paragraph authorizes commutation rates not in excess of 7 cents per mile for automobiles and 3 cents per mile for motorcycles, in lieu of the actual operating expenses, to cover cost of gasoline, oil, garage enroute, ferriage, tolls, etc., in connection with the official use of privately-owned vehicles.

(f) COLLECTION OF SEED GRAIN LOANS

Appropriation, 1930	$10,000
Budget, 1931	90,000
Increase	80,000

The purpose of this increase is as follows:

The appropriation for collection of seed grain loans for 1930 was for the purpose of collecting seed loans made in the northwestern States in 1921 and 1922, in New Mexico in 1924, and in Florida in 1926. While considerable amounts remain unpaid in these states, for the most part the delinquent borrowers can not be reached or are unable to make these payments. The Department is able to obtain security in the form of crop mortgages only as the borrower voluntarily gives it. For this work a comparatively small appropriation is needed. The necessity for the increase recommended lies in the fact that under the Act of February 25, 1929, an appropriation of $6,000,000 for loans to farmers in the southeastern States was included in the Second Deficiency Act, Second Session, 70th Congress. Out of this appropriation, approximately $5,500,000 was loaned in the spring of 1929, which loans are now in process of collection. Collections to October 15, 1929 amount to practically half of the outstanding loans, or slightly in excess of $2,700,000. Collection expenses during this fiscal year are being paid out of the $6,000,000 appropriation, but considerable amounts unquestionably will remain unpaid at the end of the year, and the increase in the appropriation is for the purpose of collecting these loans during the fiscal year 1931. In addition to the loans made in the spring of 1929, approximately $200,000 has been loaned this fall to vegetable growers in southern Florida, under the provisions of the amendment to the Act of February 25, 1929, this amendment having been approved May 17, 1929.

Project Statement

Project	Expended 1929	Estimated 1930	Estimated 1931	Increase
Collection of Seed Grain Loans	$11,771	$10,000	$90,000	$80,000

MISCELLANEOUS (Continued)

The following tabulation shows the situation as of October 15,1929, with respect to the several loans which have been made:

SEED LOAN SITUATION AS OF OCTOBER 15, 1929.

LOANS	AMOUNT LOANED	AMOUNT COLLECTED	PERCENTAGE OF LOANS COLLECTED.	INTEREST COLLECTED	AMOUNT OF PRINCIPAL OUTSTANDING.
Act of March 3, 1921. (NW States)	$1,957,407.20	$1,357,724.86	69.4	$122,101.02	$599,682.34
Act of March 20, 1922. (NW States)	$1,480,106.69	$1,138,166.58	76.9	$ 60,018.86	$341,940.11
Act of April 26, 1924 (New Mexico)	$ 413,953.15	$ 278,019.81	66.7	$ 21,757.66	$135,933.34
Act of February 28, 1927 (Florida)	$ 244,204.68	$ 104,244.27	42.7	$ 10,444.87	$139,960.41
Act of February 25, 1929 (SE States)	$5,750,000.00 (approx.)	$2,850,000.00 (approx.)	50.0	$ 75,000.00 (approx.)	$2,900,000.00
TOTALS	9,845,671.72	5,728,155.52	61.1	289,322.41	4,117,516.20

Activities under this Appropriation.

The appropriation for 1930, as previously stated, was for the collection of outstanding seed loans made to farmers under previous authorizations. These loans have been made over a series of years, approximately $2,000,000 having been loaned in the northwestern States in 1921; $1,500,000 in the same States in 1922; $400,000 in New Mexico in 1924, and $250,000 in Florida in 1926. While the remaining loans are to a large extent uncollectible, the Department during 1929 was able to collect $28,338.51, of which $22,037.64 was principal and $6,300.87 was interest. For the most part the Department's efforts have been confined to notifying dealers in farm crops of the borrowers' obligations, and to the sending of statements to delinquent borrowers from time to time. The loans, of necessity, are unsecured, except as the borrowers may voluntarily give mortgages on the crop for the year. A large part of the borrowers whose loans are still unpaid, particularly in the North-

western States, have long ago abandoned their farms and moved to other communities, or are engaged in other business than farming. In many cases the Department is unable to locate delinquent borrowers who have moved to new localities.

While the collection of 1929 loans has been unusually good, it is likely that at least $1,500,000 will remain unpaid at the end of the fiscal year 1930. Every effort will be made next spring to obtain liens on 1930 crops to secure loans then remaining unpaid.

Change in Language.

The change in language suggested is for the purpose of including in the authorization the loans made in the southeastern States under the Act of February 25, 1929, and the amendment thereto approved May 17, 1929.

(g) SPECIAL CORN BORER RESEARCH

(Reappropriation of Unobligated Balance of Special Corn Borer Clean-up Appropriation of February 23, 1927)

Reappropriation, 1930	$250,000
Reappropriation, Budget 1931	125,000
Decrease	125,000

This is an apparent decrease only for the reason that since the remaining unobligated balance of the corn borer clean-up appropriation of 1927 will be reduced to approximately $125,000 at the close of the fiscal year 1930, the continuation of certain parts of the special corn borer research program during 1931 is provided for by estimates under the following regular items in the bill, which together with the $125,000 proposed to be reappropriated, makes a total of $250,000 for 1931 as follows:

(1) Work financed from Special Corn Borer Item 1930, but estimated for 1931 directly under the following appropriations, is as follows:

Bureau of Animal Industry:	
Animal Husbandry Investigations	$ 10,000
Bureau of Entomology:	
Cereal and Forage Insect Investigations	40,000
Bureau of Public Roads:	
Agricultural Engineering Investigations	75,000
Total (estimated under regular appropriations 1931)	125,000

MISCELLANEOUS (Continued)

(2) Work conducted during 1930 and also estimated 1931 under Special Item is as follows:

Bureau of Plant Industry:	
Cereal Crops and Diseases	25,000
Forage Crops and Diseases	30,000
Bureau of Chemistry and Soils:	
Agricultural Chemistry	12,000
Insecticide and Fungicide Investigations	18,000
Bureau of Agricultural Economics:	
Farm Management Investigations	40,000
Total (estimated under Special Item 1931)	125,000

(3) Total, both groups 250,000

Project Statement

	Estimated, 1929	Estimated, 1930	Estimated, 1931
Bureau of Animal Industry			
Livestock Feeding Investigations	$ 9,812	$10,000	--- (a)
Bureau of Chemistry and Soils			
Investigations in economic utilization of corncobs and cornstalks	7,112	12,000	$12,000
Analysis of insecticides and chemically-treated plants	10,702	18,000	18,000
Bureau of Plant Industry			
Forage crops in corn borer regions	29,303	30,000	30,000
Corn cultural and breeding investigations	24,491	25,000	25,000
Bureau of Agricultural Economics			
Farm management in relation to corn borer infestation	13,990	40,000	40,000
Bureau of Public Roads			
Farm machinery investigations in relation to corn borer control	50,000	75,000	--- (a)
Bureau of Entomology			
Additional for corn borer parasite work	---	40,000	--- (a)
Total	145,410	250,000	125,000

(a) Continuation 1931 estimated for directly under bureau appropriations and special corn borer item reduced accordingly. Total amount transferred: $125,000.

MISCELLANEOUS (Continued)

Activities under this Appropriation

Under funds provided by this appropriation a coordinated program of special research (other than entomological) is being conducted in order to develop accurate information in the fields of agronomy, animal husbandry, engineering, agricultural chemistry, farm management, etc., to facilitate control work and restrict corn borer damage in infested areas and to have such information, with especial reference to types of farming, special methods of handling the corn crop, possible substitute crops where necessary, etc., developed in advance of the spread of the corn borer infestation to a larger area of the United States.

The item of $40,000 which was included for 1930 for the Bureau of Entomology is not a part of this program, these funds being used for expansion of the corn borer parasite work of that bureau and carried as a part of the special item during 1930 merely as a matter of convenience, since it was desired to use a part of the reappropriated balance of the special clean up appropriation of 1927 for this purpose.

A more detailed statement of the activities under the various bureau allotments follows:

Bureau of Animal Industry (Allotment $10,000. Transferred to Animal Husbandry Appropriation in 1931 Budget.)

In studies of adjustments in livestock production practices made necessary by the advent of the European corn borer the husker-shredder and the utilization of shredded stover in livestock production are being investigated. Land has been selected, plowed, and seeded for a study of the greater use of pasture crops in livestock production.

Bureau of Chemistry and Soils

The object of the investigations by this Bureau is to determine the practicability of utilizing corncobs and cornstalks as a source of industrial products and to develop insecticides which may be of value in controlling the Corn Borer.

The work is divided into two lines as follows:

(a) Investigations of the economic utilization of corncobs and cornstalks. (Allotment $12,000) Study is being made of the practicability of using this material for the production of chemicals by dry distillation processes, the possibility of using cornstalks in the manufacture of paper, fiber board, etc., in competition with other sources of raw material. Also, a study of the characteristics of

cornstalk pulp for the manufacture of paper. Investigations are being made of industrial plants which are now utilizing cornstalks and corncobs for various purposes, and a critical examination is being made to determine the possibilities of increasing the utilization of this naw material.

The results thus far accomplished indicate that the use of such materials for industrial purposes depend largely upon the economic phases of the situation.

(b) A study of insecticides which promise to be of value in the control of the Corn Borer. (Allotment $18,000) A study is being made of the chemical and physical properties of compounds containing fluorine. Some of these seem to give promise as valuable insecticides. Study is being made to determine the toxicity of these compounds to the Borer and of tolerance of the corn plants. Certain fluorine compounds are much more effective than lead arsenic in the control of the Corn Borer.

Bureau of Plant Industry:

Forage Crops and Diseases

Two general lines of work are carried on under this project, as follows:

1. Soybean Oil and Protein Investigations. (Allotment $6,446) Soybeans vary within wide limits as to their oil and protein content. Soybean oil is becoming a very important commercial product, being used in the manufacture of paints and for other industrial uses. The soybean meal which is left after the oil is extracted bids fair to become of even larger commercial importance, and the value of soybean meal is proportioned to the protein content. Since there is such a wide variation in different varieties in oil and protein content, the Department is endeavoring to select varieties that will be more suitable than any known at present for the production of oil, or will contain a higher content of protein so that the oil meal will have a higher feeding value. The results of this work will be applicable to the entire United States, including the Corn Belt and the Cotton Belt, and may very largely increase the use of soybeans as a crop on American farms.

The investigations cover the following:

a. Selections of individual soybean plants for oil and protein content with a view to securing improved varieties.
b. A study of the relation between latitude and altitude on oil and protein content of soybeans, the purpose of this investigation being to secure information as to the most favorable sections in the United States for the growing of soybeans for oil.
c. Importation and preliminary trial of large numbers of new varieties from the Orient.

The selection work with soybeans for oil and protein content requires several years for completion. Some data has been accumulated, but in the main the work has been preparatory. Up to the present time the major portion of the allotment has been expended for machinery and other permanent investments, the benefit from which cannot be realized on unless the work is continued.

2. Pasture Investigations. (Allotment $23,554) During the past few years a very great interest has been shown in the development of improved pastures. The lines of investigation have been worked out in order to secure information on how to improve pastures in the areas invaded by the

European Corn Borer, or in those areas where such an invasion may be expected. Lines of investigation are the following:

a. Pasture investigation at Beltsville. These studies are conducted in cooperation with the Bureau of Animal Industry and with the Bureau of Dairy Industry. They cover the laying down of pastures after certain specific fertilization has been used and the testing out of various fertilizer applications, methods of grazing, carrying capacity, etc. In cooperation with the Bureau of Dairy Industry a study is being made of certain new systems of pasture management developed in Germany, and the value of which in this country is to be ascertained.

b. Pasture investigations in Pennsylvania. This work is carried on in cooperation with the Pennsylvania Agricultural Experiment Station, and consists in the trying out of various fertilizers and combinations of fertilizers upon a uniform pasture mixture. Small plots are also devoted to a study of a large number of legumes and grasses, to determine if any of them are specially suitable to these conditions.

c. Pasture investigations in Michigan. This work is carried on in cooperation with the Michigan Agricultural Experiment Station, and consists in a trial of fertilizer applications to pastures to determine the value of alfalfa and sweet clover as pasture plants, and a study of emergency pasture crops.

These pasture investigations will require several years for completion, although some data has already been accumulated. A considerable investment has been made in fencing, purchase of fertilizers, etc. preparatory to the experiments now under way in Maryland, Pennsylvania and Michigan, returns on which cannot be realized unless the work is continued.

Cereal Crops and Diseases

1. Corn Agronomy

a. In infested areas (Allotment $13,300) in cooperation with the Ohio Agricultural Experiment Station and the U. S. Bureau of Entomology.

(1) Cultural experiments to determine the relation of different times and methods of planting and cultivating corn to yield of corn and to damage by the European corn Borer.
(2) Breeding to produce strains of corn that will yield well and that will be resistant to the corn borer, that will tolerate infestation with little damage, or that can be planted out of season to escape attack.

b. In noninfested areas. (Allotment $11,700) In Cooperation with four States.

(1) Cultural experiments to determine the effect on yield and quality of planting different kinds of corn at different rates and on different dates, as may be advisable with the advent of the corn borer in these areas.

Experiments to date have made clearer the relations of the European corn borer to the corn plants, have shown that some of the measures suggested to combat this pest can not be relied upon, and have pointed to methods that offer every promise of reducing damage from this insect. Continuation of the appropriation is needed during the coming fiscal year, and for some time thereafter, to permit following up the promising leads that have been obtained, especially in breeding for resistance which is a long-time process and also in cultural and fertilizer practices that promise to be helpful.

Bureau of Agricultural Economics. (Allotment $40,000)

The work of this bureau under the special appropriation consists of studies, from the economic standpoint, of adjustments in systems of farming, livestock production, and other economic adjustments which may be made necessary by corn borer infestation.

The advent of the European corn borer into American agriculture makes it necessary to work out adjustments of cropping systems, the introduction of new crops in rotation, the development of varieties adapted to the new requirements, and other changes as experience with the pest may indicate to be necessary. Many of the adjustments contemplated under this item will require years to accomplish, but, in view of the possibilities which they hold out for an amelioration of the condition due to corn borer infestation, the work is being prosecuted as rapidly as possible.

The possibility of effective control of the corn borer depends entirely on whether the control measure can be carried out at a cost which the farmer can afford and still produce his crop and livestock in competition with farmers not troubled with the borer. Actual and relative costs of the various types of operation and profits from the resulting crops and practices must be ascertained. This includes studies of the agronomic phase, including shifts in rotation and changes in methods of growing corn; the animal industry phase, including costs of production and feeding new feed crops and profits resulting therefrom; the engineering phase, including the actual and relative cost and depreciation of the different machines involved, and actual and relative costs of operation, including labor; and the farm management phase, including the general and particular changes in farm organization made necessary by these shifts in crop and livestock production. The specialists in the subject matter bureaus develop methods and practices, and

the economists must then determine actual and relative costs and profits from their use.

Studies are under way in cooperation with the States of Indiana, Michigan, and Illinois to determine the most successful farm organization to meet the situation effectively. Changes in crop rotations, livestock combinations, and types of equipment are being considered, as well as practices that will utilize corn-stalks in ways that will give greater financial returns, conserve soil fertility, and most effectively control the borer. The study in Michigan is being carried on in a heavily infested area. Indiana and Illinois are not yet heavily infested, but are in the path of the borer, and every effort should be made to establsh farm practices which will meet the situation in advance of serious damage.

A detailed study is being made of the costs of producing corn under varying practices. The States are vigorously supporting the bureau's program. Types of farming studies in other States of the corn belt are taking the corn borer situation into consideration.

Bureau of Public Roads. (Allotment $75,000: transferred to Bureau funds in 1931 Budget.)

The work of this bureau deals with control of the European corn borer by mechanical means. It is now recognized that theuse of mechanical deviced gives great promise as a means of controlling the European corn borer. The appropriation is being used for studies to develop more effective methods of using machines to control the borer. Available machinery used for producing corn has been tested to determine its effectiveness in control. When not wholly effective, attempts have been made to increase the efficiency of machines by changes in design or by devising attachments. Much of the machinery used in the production of corn has been studied in this manner.

Cutting corn at or near the ground surface has been shown to be a very effective means of control. Simple attachments for corn binders that sever the stalk at or below the surface have been developed for four of the binders now manufactured. A bulletin has been issued on this subject. A sled-type cutter and hand tool for low cutting also have been developed. Much work has been done on improving the coverage of corn stalks and other trash when plowing. Attachments for increasing the efficiency of the plow in securing coverage have been tested and new ones devised. Rakes, husker-shredders, corn pickers, and burners have been studied intensively from the standpoint of control. Sufficient progress has been made so that if the methods developed are used in those areas where corn is cut principally for fodder, it should be possible to secure satisfactory control of the borer. Endeavor is now being made to work out a definite plan of control by the use of machinery for the corn belt proper where a large part of the corn fields of any one year are planted to grain the succeeding year. Some progress has been made on this problem but much remains to be done.

The progress so far made in devising mechanical methods and equipment for corn borer control fully justify the expense so far incurred, but the inevitable spread of the borer into the corn belt and southward will present new problems arising from the corn-growing practices in those sections.

(h) LEAFHOPPER AND CURLY-TOP RESEARCH

Appropriation 1930		$230,000
Less: Expenditures 1929 from amount made immediately available:		
Plant Industry	$4,700	
Entomology	9,400	14,100
Net amount available, 1930		$215,900
Budget, 1931		215,900

Project Statement (showing allotments to bureaus)

	Expended, 1929	Estimated, 1930	Estimated, 1931
Bureau of Plant Industry . . .	$4,700	$145,926	$145,926
Bureau of Entomology	9,400	69,974	69,974
Total	14,100	215,900	215,900

Activities under this Appropriation

The $230,000 carried under this special item for 1930 supplemented regular appropriations carried under "Sugar Plant Investigations, Bureau of Plant Industry," and "Truck Crop Insects, Bureau of Entomology," in order to enable the Department to speed up its activities on the curly top disease and the sugar beet leafhopper so as to render aid as promptly as possible to the sugar beet and other vegatable growing industries, such as tomatoe, squash, beans, and horseradish, which are seriously handicapped by these two factors. The $230,000 has been allotted to the two bureaus, as shown in the foregoing project statement, and together with the funds carried under the regular appropriations as indicated, is being used as follows:

Bureau of Plant Industry -	Allotment from special appropriation,	$145,926
	Allotment from "Sugar Plant Inv." ...	44,278
	Total	190,204

(Same for 1930 and estimated, 1931)

The disease known as curly-top constitutes the greatest threat to our important domestic source of sugar, the sugar beet plantings in the intermountain and western States. Research on this problem in cooperation with the Bureau of Entomology now comprises investigations of the biology of the disease, investigations of field practices with a view to minimizing losses by modification of present practices, selection of resistant strains of sugar beets and breeding of new strains or varieties resistant to curly-top.

The funds allotted to the Bureau of Plant Industry from this appropriation are being utilized in expanding the scope of the investigations and in more intensive research regarding methods for controlling the disease. New and more suitable laboratory quarters have been provided at the field stations at Riverside, Calif., Salt Lake City, Utah, and Twin Falls, Idaho, and these laboratories are now being equipped.

Facilities have been expanded and scientific personnel augmented in connection with phases of the curly-top work carried on at Fort Collins, Colo., Logan, Utah, and Las Cruces, N.M., and plans have been made for establishment of agronomic sub-stations for testing curly-top resistant strains of beets in California, Washington, Montana and Oregon.

The most recent results of immediate practical value of the curly-top studies is the possibility of partly compensating for injury to the beet crop by the curly-top disease by closer spacing of the plants, so that a larger number of plants per acre mature. Another field practice which is found effective in minimizing losses from curly-top is planting of beet seedlings in somewhat the same manner that cabbage seedlings are transplanted commercially: such plantings have given increases of more than five tons to the acre because of the superior stand, longer growth period and ability of the larger beets to withstand curly-top infection.

Very encouraging results have been secured in the development of strains of sugar beets resistant to curly-top. Extensive plantings this year demonstrate that several of the strains selected up to the present time give fair yields even when exposed to curly-top infection and are satisfac- from the standpoint of sugar content.

If the investigations looking to methods for control of curly-top are to be continued in accordance with the plans which have been made, funds for the fiscal year 1931 and for several years thereafter fully equal to the funds provided for the fiscal year 1930 will be urgently needed.

Bureau of Entomology -	Allotment from special appropriation	$ 69,974
	Allotment from "Truck Crop Appropriation	48,111
		118,085

(Same for 1930 and estimated for 1931)

The research work conducted by the Bureau of Entomology consists of investigations of the distribution, development and habits of the sugar beet leafhopper and the development of methods for avoiding the losses to sugar beets caused by this insect. One of the principal activities under this item deals with surveys over extended areas in the intermountain region to discover the presence or absence of leafhopper infestations and to determine the reasons why these areas are either favorable or unfavorable to leafhopper development. Such surveys include a study of the wild vegetation and its succession throughout the season to discover the types of vegetation which are essential to leafhopper multiplication throughout the

summer. Attempts are also made to determine the factors which are important in affecting leafhopper migrations. Winter temperatures are collected and analyzed to find the types which are unfavorable for the survival of the insects in hibernation. Such data are important in that they indicate that certain areas are unsuited for beet culture while other areas, at least from the standpoint of the leafhopper, are favorable.

Experiments have been initiated on the direct control of the leafhopper by the use of oils of the "fly spray" type. Investigations of leafhopper have been enlarged to cover several areas in the intermountain region where several parasites are now known to exist but where parasitic control of the leafhopper is lower than expected.

(i) AGRICULTURAL INVESTIGATIONS IN COOPERATION WITH SOUTH CAROLINA EXPERIMENT STATION

Appropriation, 1930 . . . . .$40,000
Budget, 1931 40,000

Project Statement

Project	Expended, 1929	Estimated 1930	Estimated 1931
Forage Crop Investigations	$15,750	$ 10,625	$ 10,625
Soil Fertility Investigations	23,664	12,225	12,225
Dairy investigations . . .	-	17,150	17,150
Total	$39,414	$ 40,000	$ 40,000

Activities under this Appropriation

General

The work of this station, which is located near Columbia, South Carolina, is a demonstration of cropping methods and dairying practices in the sand-hill soil region of the South. Three distinct lines of investigations are followed at this station - forage crop, soil-fertility and dairy investigations.

Forage crop investigations: A comprehensive experiment is under way cooperatively, by the Bureau of Plant Industry and the Bureau of Chemistry and Soils to determine whether the sandy lands can be improved by the turning under of summer or winter legumes, or both, and whether the amount of organic matter and nitrogen in the soil can be increased by such treatment. Positive results have not yet been obtained, as the work has been carried on for only two seasons. A comprehensive set of varieties of vetch and other legumes has

MISCELLANEOUS (Continued)

been seeded, in order to determine what winter legume is best adapted to the sand-hill area. A reasonably good pasture, consisting largely of Bermuda grass and lespedeza on the uplands and carpet grass and lespedeza upon the lower ground, has been established. Experiments are planned by which a study will be made of the proper use of fertilizers and the treatment of the pasture to obtain the best results. A small area of this pasture has been fenced off and planted to kudzu, in order to determine the grazing value of this legume. A garden, in which all the possible species and varieties of grasses and to some extent the legumes adapted for forage and pasturage are tried, has been laid out. It has already been found that centipede grass, a species giving excellent results on sandy lands farther south, may be a very useful species as far north as Columbia. Lespedeza sericea, a perennial lespedeza, is also doing exceptionally well in the grass garden. An extensive series of soy beans, cow peas, velvet beans, and other related summer legumes has been planted and detailed notes taken on the habits of growth and yields under conditions obtaining in the sand-hill area. As new varieties of soy beans are received, they will be tried at this place, in order to discover the variety that will give the best yields, either for hay or for seed under the conditions obtaining in this region. A large number of species of Crotalaria have been seeded in rows to determine those best adapted to the regional conditions.

Soil fertility investigations: The work at this station embraces soil and fertilizer studies to obtain and make available information on the upbuilding and maintenance of the soil fertility of the sand-hill region of the Southeast for the growing of forage and other crops for dairy purposes, and the improvement of agricultural conditions in this section. The work comprises both field and laboratory investigations.

Results have been obtained showing the response of different forage crops to fertilizer treatment. Preliminary work in the field with cotton shows the need of plant food on the sandy soil represented by the Sandhill Station. The experimental studies with various kinds and amounts of fertilizer indicate promising returns from the use of fertilizers. The chief problem, however, is to increase the humus content of the soil and thereby its water holding capacity. This line of activity is in progress.

Dairy investigations: The dairy work at this station was only recently started. It is proposed to establish a herd of purebred Guernsey cattle and eleven animals for the foundation herd have been obtained. The dairy work will involve a demonstration of the best dairy practices in the sand-hill area of the south. Such work will follow two general lines, (a) breeding investigations and (b) feeding and management investigations. As at other regional stations bull calves from the herd will be placed with farmers in the region served, for the purpose of proving their ability to transmit high milk and butterfat producing capacity.

MISCELLANEOUS (Continued)

(j) NATIONAL ARBORETUM

Appropriation, 1930	$ ---
Budget, 1931	30,000
Increase	$30,000

This is a new item, which is submitted in order to provide for the purchase of equipment, construction of necessary toolsheds, beginning of the preparation of a topographic map and the identification of soil types, and planning for drainage of certain areas and for the establishment of a water supply system; also to begin the establishment of a system of roads and for fencing and otherwise protecting the arboretum area. For the National Arboretum purposes, 190 acres of lands in the Mount Hamilton area, District of Columbia, has been acquired, and condemnation proceedings have been begun to acquire parcels aggregating 78 acres additional.

Project Statement

Project	Expended 1929	Estimated 1930	Estimated 1931	Increase
Maintenance of Arboretum	-	-	$ 30,000	$30,000

Activities under this Appropriation

Under the Act of March 4, 1927 (U.S.C., Supp. III, Title 20, Secs. 191-194), authorizing its establishment, the purpose of the National Arboretum is research and education concerning tree and plant life. The Act provides also that in order to stimulate research and discovery the National Arboretum shall be under competent scientific direction, and that it shall be administered separately from the agricultural, horticultural, and forestry stations of the Department of Agriculture, but shall be so correlated with them as to bring about the most effective utilization of its facilities and discoveries. With the $300,000 thus far authorized and appropriated for the buying of land, 190 acres has been purchased and 78 acres additional is under condemnation.

(k) FOREST ROADS AND TRAILS

Appropriation, 1930	$8,000,000
Budget, 1931	7,500,000
Decrease	$ 500,000

Of the $8,000,000 carried in the 1930 Appropriation Act it was necessary to spend $1,439,370 in the fiscal year 1929. This left a balance available to meet payments during the fiscal year 1930 of $6,560,630. Since it is estimated that payments during the fiscal year 1930 will amount to

approximately $8,500,000, it is contemplated that a supplemental estimate of $2,000,000 will be submitted to meet obligations accruing during the balance of the current fiscal year.

Changes in Language

The following proviso has been omitted from the appropriation item:

"Provided further, That the appropriations heretofore, herein, and hereafter made for the purpose of carrying out the provisions of Section 8 of the Act of July 11, 1916 (A.S.C. (pp.422,423) title 16, Sec. 503), and of Section 23 of the Federal Highway Act of November 9, 1921, and Acts amendatory thereof and supplemental thereto, shall be considered available for the purpose of discharging the obligations created thereunder in any State or Territory."

The above paragraph is now permanent legislation and need not be carried in the appropriation Act for 1931.

The following proviso has been added to the item:

"Provided further, That there shall be available from this appropriation not to exceed $25,000 for the purchase of land and not to exceed $120,000 for the acquisition by purchase or construction of a building or buildings for the storage and repair of Government equipment for use in the construction and maintenance of roads."

The buildings and other structures used for the several equipment depots in the West are of a temporary character and are now in such condition that they need to be replaced with permanent structures. The amounts given in the above paragraph will provide for the construction of buildings at one of the larger equipment depots, and for the purchase of land if this is found to be necessary.

Project Statement

Project	Expended 1929	Estimated 1930	Estimated 1931
Construction and maintenance of forest roads of primary importance to States and counties	$5,100,360	$5,360,630	$4,500,000
Construction and maintenance of forest roads and trails of primary importance to protection, administration, and utilization of the National Forests	3,801,945	3,200,000	3,000,000
Total	$8,902,305	$8,560,630	$7,500,000

MISCELLANEOUS (Continued)

Activities under this Appropriation

This appropriation, under the provisions of Section 23 of the Federal Highway Act of November 9, 1921, is made for forest roads and trails. It is split into two parts, the Forest Highway Fund and the Forest Road Development Fund. The Forest Road system as planned includes 61,131 miles of road and 131,087 miles of trail. The road system when completed will provide a mile of road for 3,598 acres or 5.62 square miles as an average.

The Forest Highway Fund is expended for roads necessary to the Forests but of primary importance to the State, counties or communities within, adjoining, or adjacent, to the National Forests. The Forest Highway system as now planned includes 15,332 miles of which 39% is considered to be of satisfactory standard at present. During the fiscal year 1929 the expenditures from the Forest Highway Fund were $5,100,000. The expenditures prior to June 30, 1929, aggregated $32,453,559. The miles of road constructed from the Forest Highway and cooperative funds were 279 miles for the fiscal year 1929 and 4,507 miles to June 30, 1929, at an average cost of about $13,073 per mile. In the fiscal year 1929, 1,382 miles of road were maintained from the Forest Highway and cooperative funds with an average cost of $383 per mile.

The Forest Road Development Fund is appropriated and expended for roads and trails of primary importance to the administration, protection and utilization of the National Forests. Due to urgent need for transportation facilities for protection of the Forests against fire, a major portion of the appropriation is now expended on the construction and maintenance of protection roads and trails. The system as now planned includes 45,779 miles of road and 131,087 miles of trail. 42% of the road system and 69% of the trail system is considered to be of satisfactory standard at present. The fiscal year 1929 expenditures from the Forest Road Development Fund were $3,801,945 and total to June 30, 1929, $23,040,810. Within that fiscal year 1,734 miles of Development road were constructed or improved from Federal and cooperative funds. The total of such work to June 30, 1929, was 12,224 miles and the average cost per mile was $1,495. In the fiscal year 1929, 16,040 miles of Development road were maintained from Federal and cooperative funds at an average cost of $48 per mile.

(1) FEDERAL AID HIGHWAY SYSTEM

Appropriation, 1930	$74,000,000
Budget, 1931	75,000,000
Increase	1,000,000

Project Statement

Project	Expended 1929	Estimated 1930	Estimated 1931
Federal-Aid Highway System	$84,006,619	$79,000,000	$75,000,000

Of the appropriation of $74,000,000 provided in the Agricultural Act for 1930, $26,500,000 was used for completing payments to the States during

the latter part of the fiscal year 1929. This left a balance available July 1, 1929 of $47,500,000 for 1930. Since payments for 1930 are estimated at $79,000,000 it is anticipated that a supplemental estimate will be requested to complete the fiscal year 1930. The estimated expenditures for 1931 are $75,000,000, the amount of the budget estimate.

Activities under this Appropriation

This item provides funds for cooperation with the several States in the construction of the Federal Aid Highway System under the terms of the Federal Highway Act. This system comprises approximately 188,000 miles of the main highways of the country selected by the States and approved by the Secretary of Agriculture. Federal Aid road work was started under the Federal Aid Road Act in 1916. Up to September 30, 1929, provision had been made for the improvement with Federal aid of 91,291 miles of highway. Since 1925 authorizations for the work have been at the rate of $75,000,000 per year. Under these authorizations the work has been carried forward by the Secretary of Agriculture acting through the Bureau of Public Roads and funds are appropriated as required to make payments to the States.

(m) MOUNT VERNON MEMORIAL HIGHWAY

Appropriation, 1930:	
Facial	-
Reappropriation	$2,423,407
Budget, 1931	2,000,000

Of the authorization of $4,500,000 contained in the Act approved May 23, 1928, for construction of the Mt. Vernon Memorial Highway, $2,500,000 was appropriated in the Second Deficiency Act, 1928, and the unexpended balance of this amount, $2,423,407 was reappropriated for 1930 by the Agricultural Appropriation Act for 1930. The $2,000,000 authorized but not yet appropriated ($1,000,000 for the fiscal year 1930 and $1,000,000 for the fiscal year 1931) will be needed during the fiscal year 1931 in order to carry out the provisions of the enabling act.

Project Statement

Project	Expended 1929	Estimated 1930	Estimated 1931
Mt. Vernon Memorial Highway	$ 76,109	$2,423,407	$2,000,000

Activities under this Appropriation

This appropriation is for the purpose of building a boulevard connecting the city of Washington with Mount Vernon. It will connect with the Memorial Bridge across the Potomac which is now under construction. It is expected that the highway will be completed in time for the celebration of the two hundredth anniversary of the birth of George Washington.

LAWS PERTAINING DIRECTLY OR INDIRECTLY

to the

ESTIMATES OF APPROPRIATIONS

of the

DEPARTMENT OF AGRICULTURE

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Laws pertaining directly or indirectly to the Estimates of Appropriations of the Department of Agriculture.

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Acquisition of Lands Act (Mar. 1, 1911, 36 Stat. 961; June 7, 1924, 43 Stat. 653, U.S.C. 426, 427)
Adams Act (Mar. 16, 1906, 34 Stat. 63, 64, U.S.C. 115, 116)
Administration of Experiment Stations Acts (Feb. 16, 1929, 45 Stat. 1191)
Administration of Warehouse Act (Aug. 11, 1916, 39 Stat. 486-491, U.S.C 107-110)
Aerial Fire Control Act (Feb. 16, 1929, 45 Stat. 1204)
Aerology Act (Feb. 16, 1929, 45 Stat. 1195)
Agricultural Chemical Investigations Act (June 3, 1902, 32 Stat. 303, U.S.C. 57)
Agricultural College Acts (July 2, 1862, 12 Stat. 503; Aug. 30, 1890, 26 Stat. 417; Mar. 4, 1907, 34 Stat. 1256, 1281, U.S.C. 113-115; May 22, 1928, 45 Stat. 711, 712, 894, U.S.C., Supp. III, 36)
Agricultural Economics Act (establishment of bureau) (May 11, 1922, 42 Stat. 532, U.S.C. 118)
Agricultural Engineering Act (Feb. 16, 1929, 45 Stat. 1211)
Agricultural Exhibits at Fairs Act (Feb. 16, 1929, 45 Stat. 1193)
Agricultural Experiment Stations Acts (Mar. 2, 1887, 24 Stat. 440; Mar. 16, 1906, 34 Stat. 63; Feb. 24, 1925, 43 Stat. 970-972, U.S.C. 115-117; May 16, 1928, 45 Stat. 571, 572, U.S.C. Supp. III, 36,37)
Agricultural Extension Work Act (May 8, 1914, 38 Stat. 372-374, U.S.C. 114, 115; May 22, 1928, 45 Stat. 711, 712, 894; Feb. 23, 1929, 45 Stat. 1256, U.S.C. Supp. III, 36,37)
Agricultural Investigations South Carolina Experiment Station Act (Mar. 3, 1927, 44 Stat. 1397, U.S.C. Supp. III, 36)
Air Commerce Act (Weather Bureau) (May 20, 1926, 44 Stat. 571, U.S.C. Supp. III, 105)
Alaska Act (Feb. 23, 1929, 45 Stat. 1256, U.S.C. Supp. III, 37)
Alaska Game Commission Act (Jan. 13, 1925, 43 Stat. 739-747, U.S.C. 1573-1577)
Animal Husbandry Investigations Act (Feb. 16, 1929, 45 Stat. 1197)
Animal Industry Act (establishment of bureau) (May 29, 1884, 23 Stat. 31, U.S.C. 117)
Animal Quarantine Acts (Feb. 2, 1903, 32 Stat. 791; Mar. 3, 1905, 33 Stat. 1264, 1265, U.S.C. 632,633)
Animals, Contagious Diseases, Acts (May 29, 1884, 23 Stat. 31; Feb. 2, 1903 32 Stat. 791; Mar. 3, 1905, 33 Stat. 1264, U.S.C. 631-634)
Appointments and Changes in Salaries out of Lump Funds Act (Mar. 4, 1907, 34 Stat. 1280, U.S.C. 57)
Appointment of Officers, Clerks, and Other Employees Acts (R.S. 169; Aug. 5, 1882, 22 Stat. 255; Mar. 4, 1923, 42 Stat. 1488, U.S.C. 30)
Appropriations, Interchange Act (Feb. 26, 1923, 42 Stat. 1316)
Arlington Farm Act (Apr. 18, 1900, 31, Stat. 135, 136)
Assistant Secretary, duties of, Act (Feb. 9, 1889, 25 Stat. 659; June 30, 1906, 34 Stat. 670, U.S.C. 56, 57)

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Barley Investigations Act (Mar. 4, 1929, 45 Stat. 1635)
Bear River Migratory-Bird Refuge Act (Apr. 23, 1928, 45 Stat. 448-450, U.S.C. Supp. III, 144, 145)
Bee Culture Act (Fed. 16, 1929, 45 Stat. 1209)
Beetles, Japanese and Asiatic Act (Feb. 16, 1929, 45 Stat. 1216)
Biological Investigations Act (Feb. 16, 1929, 45 Stat. 1209)
Biophysical Laboratory Act (Feb. 16, 1929, 45 Stat. 1202)
Blister Rust Act (Feb. 16, 1929, 45 Stat. 1200)
Botany Act (Feb. 16, 1929, 45 Stat. 1201)
Budget and Accounting Act (June 10, 1921, 42 Stat. 20-27, U.S.C. 975-978)
Buildings, Rent of in District of Columbia, Act (Mar. 3, 1877, 19 Stat. 370, U.S.C. 1290; Aug.11, 1916, 39 Stat. 469)
Bureau of Agricultural Economics Act (establishment of bureau) (May 11, 1922, 42 Stat. 532, U.S.C. 118)
Bureau of Animal Industry (establishment of bureau) (May 29, 1884, 23 Stat. 31, U.S.C. 117)
Bureau of Dairy Industry Act (establishment of bureau) (May 29, 1924, 43 Stat. 243, U.S.C. 117)

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Capper-Ketcham Act (May 22, 1928, 45 Stat. 711, 712, U.S.C. Supp. III, 36)
Cattle Quarantine Acts (Feb. 2, 1903, 32 Stat. 791; Mar. 3, 1905, 33 Stat. 1264, 1265, U. S. C. 632,633)
Caustic Poison Act (Mar. 4, 1927, 44 Stat. 1406-1410, U.S.C.Supp. III, 106)
Center Market Act (Feb. 16, 1929, 45 Stat. 1215)
Cereal and Forage Insects Act (Feb. 16, 1929, 45 Stat. 1208)
Cereal Crops and Diseases Act (Feb. 16, 1929, 45 Stat. 1201)
Certification of Exports Act (Feb. 16, 1929, 45 Stat. 1217)
Citrus Canker Eradication Act (Feb. 16, 1929, 45 Stat. 1200)
Civil Service Act (Jan. 16, 1883, 22 Stat. 403, U.S.C. 63)
Civil Service Retirement Act (May 22, 1920, 41 Stat. 614, U.S.C. 71, U.S.C. Supp. III, 23-28)
Clarke-McNary Act (June 7, 1924, 43 Stat. 653-655, U.S.C. 427, U.S.C. Supp. III, 140)
Classification Act of 1923, and Welch Act amendment thereto (Mar. 4, 1923, 42 Stat. 1488-1499, U.S.C. 65-71; May 28, 1928, 45 Stat. 776-785, U.S.C. Supp. III, 18-22)
Clerks, Officers and Other Employees, appointment of, Acts (R.S. 169; Aug 5, 1882, 22 Stat. 255; Mar. 4, 1923, 42 Stat. 1488, U.S.C. 30)
Climax Basket Act (Aug. 31, 1916, 39 Stat. 673,674, U.S.C. 377)
Collecting and Publishing Statistics of the Grade and Staple Lengths of Cotton Act (Mar. 3, 1927, 44 Stat. 1373-1374, U.S.C. Supp. III, 40)
Color Investigations Act (Feb. 16, 1929, 45 Stat. 1207)
Commerce Act, Air (May 20, 1926, 44 Stat. 571, U.S.C. Supp. III, 105)
Contingent Fund Act (Miscellaneous Expenses) (Aug. 10, 1912, 37 Stat. 296 U.S.C. 58; Feb. 16, 1929, 45 Stat. 1190)
Cooperative Agricultural Extension Work Act (May 8, 1914, 38 Stat. 372-374, U.S.C. 114,115; May 16, 1928, 45 Stat. 542, U.S.C. Supp. III, 36,37)

Cooperative Distribution of Forest Planting Stock Act (June 7, 1924, 43 Stat. 654, U.S.C. 426-428, U.S.C. Supp. III, 140)
Cooperative Farm Forestry Act (June 7, 1924, 43 Stat. 653-655, U.S.C. 426-428; U.S.C. Supp. III, 140)
Cooperative Marketing Act (July 2, 1926, 44 Stat. 802, 803, U.S.C. 1895, 1896, U.S.C. Supp. III, 39)
Cooperative Road Construction Acts (July 11, 1916, 39 Stat. 355, U.S.C. 422; Nov. 9, 1921, 42 Stat. 212, U.S.C. 668; June 22, 1926, 44 Stat. 760; May 21, 1928, 45 Stat. 683, U.S.C. Supp. III, 179; May 26, 1928 45 Stat. 750)
Cooperative Work, Forest Service, Act (June 30, 1914, 38 Stat. 430, U.S.C. 422)
Corn Borer, European, Acts (Feb. 9, 1927, 44 Stat. 1065; Feb. 23, 1927, 44 Stat. 1177, U.S.C. Supp. III, 34; Feb. 16, 1929, 45 Stat. 1216)
Corn Borer, Special Research Act, (Feb. 16, 1929, 45 Stat. 1219, 1220)
Cotton Futures Act (Aug. 11, 1916, 39 Stat. 476-482; Mar. 4, 1919, 40 Stat. 1451, U.S.C. 788-791)
Cotton Insects Act (Feb. 16, 1929, 45 Stat. 1208)
Cotton Production and Diseases Act (Feb. 16, 1929, 45 Stat. 1200)
Cotton Standards Act (Mar. 4, 1923, 42 Stat. 1517-1520, U.S.C. 90)
Cotton Statistics Act (Mar. 3, 1927, 44 Stat. 1372; U.S.C. Supp. III, 40)
Crop and Livestock Estimates Act (Feb. 16, 1929, 45 Stat. 1212)

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Dairy Industry Act (establishment of bureau) (May 29, 1924, 43 Stat. 243, U.S.C. 117)
Dairy Investigations Act (Feb. 16, 1929, 45 Stat. 1199)
Dairy and Livestock Production in Western U.S. Act (Aug. 11, 1916, 39 Stat. 491)
Dairy and Livestock Station (Tennessee) Act (May 29, 1928, 45 Stat. 981, U.S.C. Supp. III, 38)
Date Scale Act (Feb. 16, 1929, 45 Stat. 1216)
Deciduous Fruit Insects Act (Feb. 16, 1929, 45 Stat. 1208)
Department of Agriculture Act (creating Executive Department) (Feb. 9, 1889, 25 Stat. 659, U.S.C. 56)
Department of Agriculture detail of employees Acts (Mar. 4, 1927, 34 Stat. 1280; Mar. 4, 1911, 36 Stat. 1236, 1261; Aug. 10, 1912, 37 Stat. 294, U.S.C. 57)
Department of Agriculture Laws Continued in Force Act (Feb. 9, 1889, 25 Stat. 659)
Department of Agriculture Lump Fund Appointments and Changes in Salaries Act (Mar. 4, 1907, 34 Stat. 1280, U.S.C. 57)
Department of Agriculture, Officers, Clerks, and Other Employees, Appointment of, Acts (R.S. 169; Aug. 5, 1882, 22 Stat. 255; Mar. 4, 1923, 42 Stat. 1488, U.S.C. 30)
Department of Agriculture Organic Act (May 15, 1862, 12 Stat. 387, U.S.C. 56)
Diseases of Animals Act (May 29, 1884, 23 Stat. 31; Feb. 2, 1903, 32 Stat. 791; Mar. 3, 1905, 33 Stat. 1264, U.S.C. 631-634)
Dockery Act (July 31, 1894, 28 Stat. 162, U.S.C. 978)
Dourine Act (Feb. 16, 1929, 45 Stat. 1198)
Drug and Related Plants Act (Feb. 16, 1929, 45 Stat. 1201)
Dry Land Agriculture Act (Mar. 19, 1928, 45 Stat. 323; April 16, 1928, 45 Stat. 430; 431, U.S.C.Supp. III, 37; Feb. 16, 1929, 45 Stat. 1201)

Duties of Secretary of Agriculture Act (Feb. 9, 1889, 25 Stat. 659; July 14, 1890, 26 Stat. 288, U.S.C. 56)
Duties of Assistant Secretary of Agriculture Act (Feb. 9, 1889, 25 Stat. 659; June 30, 1906, 34 Stat. 670, U.S.C. 56)

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Economic Investigations Act (Feb. 16, 1929, 45 Stat. 1215)
Eight-Hour Law (Aug. 1, 1892, 27 Stat. 340, U.S.C. 1307; Mar. 3, 1913, 37 Stat. 726)
Employees Compensation Act (Sept. 7, 1916, 39 Stat. 742, U.S.C. 76)
Employees, Detail of, Acts (Mar. 4, 1907, 34 Stat. 1280; Mar. 4, 1911, 36 Stat. 1236, 1261; Aug. 10, 1912, 37 Stat. 294, U.S.C. 57)
Enforcement of Foreign Plant Quarantine Act (Aug. 20, 1912, 37 Stat. 319, U.S.C. 98; May 1, 1928, 45 Stat. 468, U.S.C. Supp. III, 35)
Enforcement of Grain Futures Act (Sept. 21, 1922, 42 Stat. 998, U.S.C. 87)
Enforcement of Insecticide Act (Apr. 26, 1910, 36 Stat. 331, U.S.C. 95)
Equipment and Supplies Act (Forest Service) (Feb. 16, 1929, 45 Stat. 1204)
Eradication and Control of Animal Diseases Acts (May 29, 1884, 23 Stat. 31; Feb. 2, 1903, 32 Stat. 791; Mar. 3, 1905, 33 Stat. 1264, U.S.C. 631)
Eradication and Control of Foot-and-Mouth and Other Contagious Diseases of Animals Act (May 29, 1884, 23 Stat. 32, U.S.C. 631)
Eradication of Cattle Ticks Act (Feb. 16, 1929, 45 Stat. 1197)
Eradication of Dourine Act (Feb. 16, 1929, 45 Stat. 1198)
Eradication of Hog Cholera Act (Feb. 16, 1929, 45 Stat. 1197)
Establishment of Bureau of Agricultural Economics Act (May 11, 1922, 42 Stat. 532, U.S.C. 118)
Establishment of Bureau of Animal Industry Act (May 29, 1884, 23 Stat. 31, U.S.C. 117)
Establishment of Bureau of Dairy Industry Act (May 29, 1924, 43 Stat. 243, U.S.C. 117)
Establishment of Dairy and Livestock Station (Tennessee) Act (May 29, 1928, 45 Stat. 981, U.S.C. Supp. III, 38)
Establishment of Weather Bureau Act (Oct. 1, 1890, 26 Stat. 653, U.S.C. 381)
Estimates of Grade and Staple Lengths of Cotton Act (May. 3, 1927, 44 Stat. 1372, U.S.C. Supp. III, 40)
European Corn Borer Act (Feb. 9, 1927, 44 Stat. 1065; Feb. 23, 1927, 44 Stat. 1177, U.S.C. Supp. III, 34; Feb. 16, 1929, 45 Stat. 1216)
Exhibits at Fairs Act (Feb. 16, 1929, 45 Stat. 1193)
Expenses in Washington Act (Weather Bureau) (Feb. 16, 1929, 45 Stat. 1194)
Expenses Outside of Washington Act (Weather Bureau) (Feb. 16, 1929, 45 Stat. 1195)
Experiments and Demonstrations Livestock Production Southern U.S.Act (June 30, 1914, 38 Stat. 441)
Experiments in Dairying and Livestock Western U.S. Act (Aug. 11, 1916, 39 Stat. 491)
Export Cattle Act (Mar. 3, 1891, 26 Stat. 833, U.S.C. 1444)
Exports, Certification, Act (Feb. 16, 1929, 45 Stat. 1217)

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Farm Management and Practice Act (Feb. 16, 1929, 45 Stat. 1211, 1212)
Farmers' Cooperative Demonstrations Act (Feb. 16, 1929, 45 Stat. 1193)
Federal Aid Road Acts (July 11, 1916, 39 Stat. 355, U.S.C. 422; Nov. 9, 1921, 42 Stat. 212, U.S.C. 665, June 22, 1926, 44 Stat. 760; May 21, 1928 45 Stat. 683, U.S.C. Supp.III, 179, May 26, 1928, 45 Stat 750)

Fertilizer Investigations Act (Feb. 16, 1929, 45 Stat. 1207)
Fighting Forest Fires Act (Feb. 16, 1929, 45 Stat. 1204)
Food and Drugs Administration Act (June 30, 1906, 34 Stat. 768, U.S.C. 621)
Food Habits of Birds and Animals Act (Feb. 16, 1929, 45 Stat. 1209)
Foot-and-Mouth Disease Act (May 29, 1884, 23 Stat. 32, U.S.C. 631)
Forage Crops and Diseases Act (Feb. 16, 1929, 45 Stat. 1202)
Foreign Plant Introduction Act (Feb. 16, 1929, 45 Stat. 1202)
Foreign Plant Quarantines Act (Aug. 20, 1912, 37 Stat. 319, U.S.C. 98: May 1, 1928, 45 Stat. 468, U.S.C. Supp. III, 35)
Forest Fire Cooperation Act (June 7, 1924, 43 Stat. 653, U.S.C. 427, U.S.C. Supp. III, 140)
Forest Insects Act (Feb. 16, 1929, 45 Stat. 1208)
Forest Pathology Act (Feb. 16, 1929, 45 Stat. 1200)
Forest Products Investigations Act (Feb. 16, 1929, 45 Stat. 1205)
Forest Research Act (May 22, 1928, 45 Stat. 699, U.S.C. Supp. III, 141)
Forest Reservation Commission Act (Mar. 1, 1911, 36 Stat. 962, U.S.C. 424)
Forest Roads and Trails Act (July 11, 1916, 39 Stat. 355, U.S.C. 422; Nov. 9, 1921, 42 Stat. 212, U.S.C. 668; June 22, 1926, 44 Stat. 760; May 21, 1928, 45 Stat. 683, U.S.C. Supp. III, 179; May 26, 1928, 45 Stat. 750)
Forest Service Cooperative Work (June 30, 1914, 38 Stat. 430, U.S.C. 422)
Forest Service Refunds to Depositors Act (Mar. 4, 1907, 34 Stat. 1270, U.S.C. 422)
Forest Service Transfer Act (Feb. 1, 1905, 33 Stat. 628, U.S.C. 419)
Fruit Worm Act (Feb. 16, 1929, 45 Stat. 1216)
Fur-Bearing Animals Act (Feb. 16, 1929, 45 Stat. 1209)

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Gardens and Grounds Act (Feb. 16, 1929, 45 Stat. 1202)
General Administrative Acts (Salaries and Expenses)
- Office of the Secretary (Feb. 16, 1929, 45 Stat. 1189)
- Office of Information (Feb. 16, 1929, 45 Stat. 1190)
- Library, Department of Agriculture (Feb. 16, 1929, 45 Stat.1191)
- Office of Experiment Stations (Feb. 16, 1929, 45 Stat. 1192)
- Extension Service (Feb. 16, 1929, 45 Stat. 1193)
- Weather Bureau (Feb. 16, 1929, 45 Stat. 1194)
- Bureau of Animal Industry (Feb. 16, 1929, 45 Stat. 1196)
- Bureau of Dairy Industry (Feb. 16, 1929, 45 Stat. 1199)
- Bureau of Plant Industry (Feb. 16, 1929, 45 Stat. 1200)
- Forest Service (Feb. 16, 1929, 45 Stat. 1203)
- Bureau of Chemistry and Soils (Feb. 16, 1929, 45 Stat. 1206)
- Bureau of Entomology (Feb. 16, 45 Stat. 1208)
- Bureau of Biological Survey (Feb. 16, 1929, 45 Stat. 1209)
- Bureau of Public Roads (Feb. 16, 1929, 45 Stat. 1211)
- Bureau of Agricultural Economics (Feb. 16, 1929, 45 Stat. 1211)
- Bureau of Home Economics (Feb. 16, 1929, 45 Stat. 1215)
- Plant Quarantine and Control Administration (Feb.16,1929, 45 Stat.1216)
- Grain Futures Administration (Feb. 16, 1929, 45 Stat. 1217)
- Food and Drug Administration (Feb. 16, 1929, 45 Stat. 1217)

Government Employees Compensation Act (Sept. 7, 1916, 39 Stat. 742, U.S.C. 76)
Grade and Staple Lengths of Cotton Act (Mar. 3, 1927, 44 Stat. 1372, U.S.C.Supp III, 40)
Grain Futures Act (Sept. 21, 1922, 42 Stat. 998, U.S.C. 87)
Grain Standards Act (Aug. 11, 1916, 39 Stat. 482, U.S.C. 91)
Gypsy and Brown-Tail Moths Act (Feb. 16, 1929, 45 Stat. 1216)

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Hatch Act (Mar. 2, 1887, 24 Stat. 440, U.S.C. 115; May 16, 1928, 45 Stat. 571; Feb. 23, 1929, 45 Stat. 1256, U.S.C. Supp. III, 36)
Hawaii Act (May 16, 1928, 45 Stat. 571, U.S.C. Supp. III, 36)
Hog Cholera Act (Feb. 16, 1929, 45 Stat. 1197)
Home Economics Investigations Act (Feb. 16, 1929, 45 Stat. 1215)
Horticultural Protection Act (Weather Bureau) (Feb. 16, 1929, 45 Stat. 1195)
Hours of Service Act (Aug. 1, 1892, 27 Stat. 340, U.S.C. 1307; Mar. 3, 1913, 37 Stat. 726)

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Importation Cattle Acts (Aug. 30, 1890, 26 Stat. 416; Nov. 21, 1918, 40 Stat. 1048, U.S.C. 630)
Importation Milk Act (Feb. 15, 1927, 44 Stat. 1103, U.S.C. Supp. III, 169)
Improvement of National Forests Act (Feb. 16, 1929, 45 Stat. 1205)
Insecticide Enforcement Act (Food and Drug Admn.) (Apr. 26, 1910, 36 Stat. 335, U.S.C. 95)
Insecticide and Fungicide Investigations Act (Chemistry and Soils) (Feb. 16, 1929 45 Stat. 1218)
Insects Affecting Man and Animals Act (Feb. 16, 1929, 45 Stat. 1208)
Inspection and Quarantine Acts (Feb. 2, 1903, 32 Stat. 791; Mar. 3, 1905, 33 Stat. 1264, U.S.C. 632; Feb. 16, 1929, 45 Stat. 1196)
Inspection of Animals for Importation Act (Aug. 30, 1890, 26 Stat. 416; Nov. 21, 1918, 40 Stat. 1048, U.S.C. 630)
Inspection of Vessels Carrying Export Animals Act (Mar. 3, 1891, 26 Stat. 833, U.S.C. 1444)
Insular Experiment Stations Acts (Mar. 2, 1887, 24 Stat. 440; Mar. 16, 1906, 34 Stat. 63; Feb. 24, 1925, 43 Stat. 970, U.S.C. 115)
Interchange of Appropriations Act (Feb. 26, 1923, 42 Stat. 1316)

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Japanese and Asiatic Beetles Act (Feb. 16, 1929, 45 Stat. 1216)

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Lacey Game Act (May 25, 1900, 31 Stat. 187, U.S.C. 436, 492, 493)
Land Arlington Farm Act (Apr. 18, 1900, 31 Stat. 135)
Land Classification Act (Feb. 16, 1929, 45 Stat. 1204)
Lands Acquisition Act (Mar. 1, 1911, 36 Stat. 961, U.S.C. 424)
Law Clerks, Detail of, Act (Mar. 4, 1911, 36 Stat. 1236, U.S.C. 57)
Laws Applicable to Department Continued in Force Act (Feb. 9, 1889, 25 Stat. 659)
Livestock and Dairy Station (Tennessee) Act (May 29, 1928, 45 Stat. 981, U.S.C. Supp. III, 38)
Livestock Contagious Diseases Acts (May 29, 1884, 23 Stat. 31; Feb. 2, 1903, 32 Stat. 791; Mar. 3, 1905, 33 Stat. 1264, U.S.C. 631)
Livestock Production in Southern U.S. Act (June 30, 1914, 38 Stat. 441)
Livestock Quarantine Acts (Feb. 2, 1903, 32 Stat. 791; Mar. 3, 1905, 33 Stat. 1264, U.S.C. 632)
Lump Fund Appointments and Changes in Salaries Act (Mar. 4, 1907, 34 Stat. 1280, U.S.C. 57)

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Maintenance of Mammal and Bird Reservations Act (Feb. 16, 1929, 45 Stat. 1209)
Market Inspection of Farm Products Act (Feb. 16, 1929, 45 Stat. 1212)
Market News Service Act (Feb. 16, 1929, 45 Stat. 1213)
Marketing and Distributing Farm Products Act (Feb. 16, 1929, 45 Stat. 1212)
McNary-McSweeney Act (May 22, 1928, 45 Stat. 699, U.S.C. Supp. III, 141)
McNary-Woodruff Act (Apr. 30, 1928, 45 Stat. 468, U.S.C. Supp. III, 139)
Meat Inspection Acts (Aug. 30, 1890, 26 Stat. 414; Mar. 3, 1891, 26 Stat. 1089; June 30, 1906, 34 Stat. 674; Mar. 4, 1907, 34 Stat. 1256; July 24, 1919, 41 Stat. 241, U.S.C. 627)
Mechanical Shops and Power Plant Act (May 11, 1922, 42 Stat. 508, U.S.C. 58)
Mexican Fruit Worm Act (Feb. 16, 1929, 45 Stat. 1216)
Migratory Bird Conservation Act (Feb. 18, 1929, 45 Stat. 1222, U.S.C. Supp. III, 145)
Migratory Bird Treaty Act (July 3, 1918, 40 Stat. 757, U.S.C. 436)
Mileage Rates for Motor Vehicles Act (Feb. 26, 1923, 42 Stat. 1319)
Milk Importation Act (Feb. 15, 1927, 44 Stat. 1103, U.S.C. Supp. III, 169)
Miscellaneous Expenses Act (Contingent Fund) (Aug. 10, 1912, 37 Stat. 296, U.S.C. 58; Feb. 16, 1929, 45 Stat. 1190)
Mississippi River Refuge Act (June 7, 1924, 43 Stat. 650; Mar. 4, 1925, 43 Stat. 1354, U.S.C. 437; May 12, 1928, 45 Stat. 502, U.S.C. Supp. III, 147)
Morrill Acts (July 2, 1862, 12 Stat. 503; Aug. 30, 1890, 26 Stat. 417, U.S.C. 111)
Moths, Gypsy and Brown-tail, Act (Feb. 16, 1929, 45 Stat. 1216)
Mt. Vernon Memorial Highway Act (May 23, 1928, 45 Stat. 721: Feb. 16, 1929, 45 Stat. 1221)
Mycology and Disease Survey Act (Feb. 16, 1929, 45 Stat. 1200)

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National Arboretum Act (Mar. 4, 1927, 44 Stat. 1422, U.S.C. Supp. III,164)
Naval Stores Act (Mar. 3, 1923, 42 Stat. 1435, U.S.C. 93; Feb. 16, 1929, 45 Stat. 1207)
Nelson Act (Mar. 4, 1907, 34 Stat. 1256, 1281, U.S.C. 113)
Nematology Act (Feb. 16, 1929, 45 Stat. 1201)

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Officers, Clerks, and Other Employees, Appointment of, Acts (R.S. 169: Aug. 5, 1882, 22 Stat. 255; Mar. 4, 1923, 42 Stat. 1488, U.S.C. 30)
Oleomargarine Act (May 9, 1902, 32 Stat. 193, U.S.C. 624)
Organic Act (Department of Agriculture) (May 15, 1862, 12 Stat. 387, U.S.C. 56)

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Packers and Stockyards Act (Aug. 15, 1921, 42 Stat. 159, U.S.C. 102)
Parlatoria Date Scale Act (Feb. 16, 1929, 45 Stat. 1216)
Passenger-Carrying Vehicles Act (July 16, 1914, 38 Stat. 508, U.S.C. 33; Feb. 16, 1929, 45 Stat. 1219)
Payment to School Funds, Arizona and New Mexico, National Forests Fund Act (June 20, 1910, 36 Stat. 561)

Payment to States and Hawaii for Agricultural Experiment Stations Acts (Mar. 2, 1887, 24 Stat. 440; Mar. 16, 1906, 34 Stat. 63: Feb. 24, 1925, 43 Stat. 971, U.S.C. 115)
Payments to States, Hawaii and Alaska for Agricultural Extension Work Act (July 2, 1862, 12 Stat. 503; May 8, 1914, 38 Stat. 372, U.S.C. 111; May 22, 1928, 45 Stat. 894)
Payment to States and Territories from National Forests Fund Act (May 23, 1908, 35 Stat. 260, U.S.C. 422)
Phony Peach Disease Act (Feb. 16, 1929, 45 Stat. 1216)
Pink Bollworm Act (Oct. 6, 1917, 40 Stat. 374, U.S.C. 98; Feb. 16, 1929, 45 Stat. 1216)
Plant Dust Explosions and Farm Fires Act (Feb. 16, 1929, 45 Stat. 1207)
Plant Nutrition Act (Feb. 16, 1929, 45 Stat. 1200)
Plant Quarantines Act (Aug. 20, 1912, 37 Stat. 319, U.S.C. 98; May 1, 1928, 45 Stat. 468, U.S.C. Supp. III, 35)
Planting on National Forests Act (Feb. 16, 1929, 45 Stat. 1204)
Poison, Caustic, Act (Mar. 4, 1927, 44 Stat. 1406, U.S.C. Supp. III, 106)
Printing and Binding Act (June 30, 1906, 34 Stat. 762, U.S.C. 1013; Feb. 16, 1929, 45 Stat. 1191)
Produce Agency Act (Mar. 3, 1927, 44 Stat. 1355, U.S.C. Supp. III, 41)
Production of Fur-Bearing Animals Act (Feb. 16, 1929, 45 Stat. 1209)
Protection and Administration of National Forests Act (Feb. 16, 1929, 45 Stat. 1203)
Protection of Migratory Birds Act (July 3, 1918, 40 Stat. 755, U.S.C. 436)
Purnell Act (Feb. 24, 1925, 43 Stat. 971, U.S.C. 115)

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Quarantine of Diseases Animals Acts (Feb. 2, 1903, 32 Stat. 791; Mar. 3, 1905, 33 Stat. 1264, U.S.C. 632)

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Range Investigations Act (Feb. 16, 1929, 45 Stat. 1205)
Reconnaissance of Forest Resources Act (Feb. 16, 1929, 45 Stat. 1204)
Refunds to Depositors Forest Service Act (Mar. 4, 1907, 34 Stat. 1270, U.S.C. 422
Reindeer, Game and Fur-Bearers in Alaska Act (Feb. 16, 1929, 45 Stat. 1210)
Renovated Butter Act (May 9, 1902, 32 Stat. 193, U.S.C. 624)
Rent of Buildings in District of Columbia Act (Mar. 3, 1877, 19 Stat. 370, U.S.C. 1290; Aug. 11, 1916, 39 Stat. 469)
Road Building and Maintenance Act (Feb. 16, 1929, 45 Stat. 1211)
Road Management Act (Feb. 16, 1929, 45 Stat. 1211)
Roads and Trails Act (Forest Service), (July 11, 1916, 39 Stat. 355, U.S.C. 422; Nov. 9, 1921, 42 Stat. 212, U.S.C. 668; June 22, 1926, 44 Stat. 760; May 21, 1928, 45 Stat. 683, U.S.C. Supp. III, 179; May 26, 1928, 45 Stat. 750)
Roads and Trails for States, National Forests Fund Act (Mar. 4, 1913, 37 Stat. 843, U.S.C. 422)
Roads, Federal Aid, Acts (Public Roads) (July 11, 1916, 39 Stat. 355, U.S.C. 422; Nov. 9, 1921, 42 Stat. 212, U.S.C. 668; June 22, 1926, 44 Stat. 760; May 21, 1928, 45 Stat. 683, U.S.C. Supp. III, 179; May 26, 1928, 45 Stat. 750)
Roads, Mt. Vernon Highway, Act (May 23, 1928, 45 Stat. 721)
Rubber, Fiber and other Tropical Plants Act (Feb. 16, 1929, 45 Stat. 1201)

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Salaries and Expenses Acts (General Administrative):
Office of the Secretary (Feb. 16, 1929, 45 Stat. 1189)
Office of Information (Feb. 16, 1929, 45 Stat. 1190)
Library, Department of Agriculture (Feb. 16, 1929, 45 Stat. 1191)
Office of Experiment Stations (Feb. 16, 1929, 45 Stat. 1192)
Extension Service (Feb. 16, 1929, 45 Stat. 1193)
Weather Bureau (Feb. 16, 1929, 45 Stat. 1194)
Bureau of Animal Industry (Feb. 16, 1929, 45 Stat. 1196)
Bureau of Dairy Industry (Feb. 16, 1929, 45 Stat. 1199)
Bureau of Plant Industry (Feb. 16, 1929, 45 Stat. 1200)
Forest Service (Feb. 16, 1929, 45 Stat. 1203)
Bureau of Chemistry and Soils (Feb. 16, 1929, 45 Stat. 1206)
Bureau of Entomology (Feb. 16, 1929, 45 Stat. 1208)
Bureau of Biological Survey (Feb. 16, 1929, 45 Stat. 1209)
Bureau of Public Roads (Feb. 16, 1929, 45 Stat. 1211)
Bureau of Agricultural Economics (Feb. 16, 1929, 45 Stat. 1211)
Bureau of Home Economics (Feb. 16, 1929, 45 Stat. 1215)
Plant Quarantine and Control Administration (Feb. 16, 1929, 45 Stat. 1216)
Grain Futures Administration (Feb. 16, 1929, 45 Stat. 1217)
Food and Drug Administration (Feb. 16, 1929, 45 Stat. 1217)

Sanitation and Fire Prevention Act (Feb. 16, 1929, 45 Stat. 1204)
Secretary of Agriculture, duties of, Act (Feb. 9, 1889, 25 Stat. 659; July 14, 1890, 26 Stat. 288, U.S.C. 56)
Seed Grain Loans Act (Mar. 3, 1921, 41 Stat. 1347; Mar. 20, 1922, 42 Stat. 467; Apr. 26, 1924, 43 Stat. 110; Feb. 28, 1927, 44 Stat. 1251)
Seed Importation Act (Aug. 24, 1912, 37 Stat. 506, U.S.C. 95)
Seed Laboratory Act (Feb. 16, 1929, 45 Stat. 1201)
Silvical Investigations Act (Feb. 16, 1929, 45 Stat. 1205)
Sirup and Sugar Investigations Act (Feb. 16, 1929, 45 Stat. 1207)
Smith-Lever Act (May 8, 1914, 38 Stat. 372, U.S.C. 114; Feb. 23, 1929, 45 Stat. 1256, U.S.C. Supp. III, 37)
Soil Chemical Investigations Act (Feb. 16, 1929, 45 Stat. 1207)
Soil Erosion Act (Feb. 16, 1929, 45 Stat. 1207)
Soil Fertility Investigations Act (Feb. 16, 1929, 45 Stat. 1208)
Soil Microbiology Act (Feb. 16, 1929, 45 Stat. 1208)
Soil Physical Investigations Act (Feb. 16, 1929, 45 Stat. 1207)
Soil Survey Investigations Act (Feb. 16, 1929, 45 Stat. 1207)
South Carolina Experiment Station Act (Mar. 3, 1927, 44 Stat. 1397, U.S.C. Supp. III, 36)
Southern Livestock Production Act (June 30, 1914, 38 Stat. 441)
Special Corn Borer Research Act (Feb. 16, 1929, 45 Stat. 1219)
Standard Apple Barrel Act (Aug. 3, 1912, 37 Stat. 250, U.S.C. 376, 624)
Standard Container Act (Aug. 31, 1916, 39 Stat. 673, U.S.C. 377)
Standard Hamper Act (May 21, 1928, 45 Stat. 685, U.S.C. Supp. III, 104)
Stored Products Insects Act (Feb. 16, 1929, 45 Stat. 1208)
Sugar Plants Act (Feb. 16, 1929, 45 Stat. 1201)

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Taxonomy and Interrelations of Insects Acts (Feb 16, 1929, 45 Stat. 1209)
Tea Importation Act (Mar. 2, 1897, 29 Stat. 604, U.S.C. 625)
Tennessee Station, Dairy and Livestock, Act (May 29, 1928, 45 Stat. 981, U.S.C. Supp. III, 38)
Territory of Alaska Act (Feb. 23, 1929, 45 Stat. 1256, U.S.C. Supp. III, 37)
Terriotry of Hawaii Act (May 16, 1928, 45 Stat. 571, U.S.C. Supp. III, 36)
Thurberia Weevil Act (Feb. 16, 1929, 45 Stat. 1216)
Tobacco Act (Feb. 16, 1929, 45 Stat. 1201)
Tobacco Stocks and Standards Act (Jan. 14, 1929, 45 Stat. 1079, U.S.C. Supp. III, 42)
Transfer of Forest Service Act (Feb. 1, 1905, 33 Stat. 628, U.S.C. 419)
Tropical, Subtropical and Ornamental Plant Insects Act (Feb. 16, 1929, 45 Stat. 1208)
Truck Crop Insects (Feb. 16, 1929, 45 Stat. 1208)
Tuberculosis Eradication Act (Feb. 16, 1929, 45 Stat. 1196)
Twenty-Eight Hour Law (June 29, 1906, 34 Stat. 607, U.S.C. 1444)

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United States Cotton Futures Act (Aug. 11, 1916, 39 Stat. 476; Mar. 4, 1919, 40 Stat. 1451, U.S.C. 788)
United States Grain Standards Act (Aug. 11, 1916, 39 Stat. 482, U.S.C. 91)
United States Warehouse Act (Aug. 11, 1916, 39 Stat. 486, U.S.C. 107)
Upper Mississippi River Refuge Act (June 7, 1924, 43 Stat. 650; Mar. 4, 1925, 43 Stat. 1354, U.S.C. 437; May 12, 1928, 45 Stat. 502, U.S.C. Supp. III, 147)

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Vehicles Passenger-Carrying Act (July 16, 1914, 38 Stat. 508, U.S.C. 33; Feb. 16, 1929, 45 Stat. 1219)
Virus Act (Mar. 4, 1913, 37 Stat. 832, U.S.C. 634)

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Warehouse Act (Aug. 11, 1916, 39 Stat. 486, U.S.C. 107)
Weather Bureau Act (establishment of bureau) (Oct. 1, 1890, 26 Stat. 653, U.S.C. 381)
Weeks Act (Mar. 1, 1911, 36 Stat. 961, U.S.C. 424)
Welch Act (May 28, 1928, 45 Stat. 776, U.S.C. Supp. III, 18)
Western Irrigation Agriculture Act (Feb. 16, 1929, 45 Stat. 1202)
White-Pine Blister Rust Act (Feb. 16, 1929, 45 Stat. 1200)
Woodward, Oklahoma, Field Station, Act (May 31, 1920, 41 Stat. 730)
Wool Standards Research Act (May 17, 1928, 45 Stat. 593, U.S.C. Supp. III, 38)
Wool Work Act (Feb. 16, 1929, 45 Stat. 1214)

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